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AN INTERIM GUIDE TO THE CANNABIS  
(MARIHUANA) LITERATURE

by

Oriana Josseau Kalant



Addiction Research Foundation  
Bibliographic Series No. 2  
1968

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## FOREWORD

The material presented in the following pages was assembled during the preparation of a comprehensive review of the literature on Cannabis. The main section of the guide (Reviews of Selected Works) comprises summaries and critical appraisals of eleven books and seven review articles. These are arranged in chronological order according to date of publication. This section is preceded by a short essay which attempts to provide an overall historical perspective on the literature, and a brief introductory statement concerning the character and effects of Cannabis. The books included are heterogeneous with respect to both scope and scientific quality. The monographs by Meunier, Brotteaux and Walton are comprehensive reviews of the field, while those by the Chopras, by the Mayor's Committee on Marihuana, and the Ciba Symposium on Hashish (Wolstenholme & Knight) are reports of original research on various aspects of Cannabis action. The books by Wolff and Johnson and the anthology edited by Solomon have been included to indicate the remarkable lack of objectivity exhibited by some writers in this highly controversial field.

Compared to that on other and newer psychotropic drugs, the literature on Cannabis includes a larger proportion of books and articles which are either out of print or difficult to locate. For this and other practical reasons the selection presented here is incomplete; it is based on a perusal of about a quarter of the total bibliography. Some of the more important book-length works not included are:

Moreau de Tours, J. -J. Du Hachich et de l'Aliénation Mentale. Etudes Psychologiques. Paris: Masson 1845, 431 pp.

[Ludlow, F. H.] The Hasheesh Eater: Being Passages from the Life of a Pythagorean. New York: Harper & Brothers 1857, 371 pp.

India-Hemp Drug Commission, 1893-1894. Report on Indian Hemp. Simla: Government Central Printing Office 1894, 7 Vols., 3281 pp.

Dardanne, A. Contribution à l'Etude du Chanvre Indien et en Particulier de son Emploi Comme Droque Sensorielle en Afrique du Nord. Paris: Vigot 1924, 152 pp.

Union of South Africa - Interdepartmental Committee. Report: Abuse of Dagga. Pretoria: Government Printer 1952, 48 pp.

Serviço Nacional de Educação Sanitaria. Maconha (Coletânea de Trabalhos Brasileiros). Rio de Janeiro: Minist. de Saude 1958, 386 pp.

Andrews, G. (Ed.). The Book of Grass - An Anthology on Indian Hemp. London: Peter Owen 1967, 242 pp.

A considerable number of comprehensive and valuable articles dealing with such aspects as the epidemiology of Cannabis use, the geographic distribution of the plant, cultivation for industrial purposes, botanical and chemical methods of identification, and national and international legislation and control are to be found in the Bulletin on Narcotics of the United Nations and in the documents of the Economic and Social Council of the U. N. of the 1950's and 1960's.

As the title states this work is intended only as an interim guide to the literature. As such it is neither all-inclusive nor necessarily consistent in approach. Each work has been handled in terms of the significance which I have attributed to it, and no attempt has been made at this time to incorporate the findings and claims of various authors into a unified whole. It is hoped, however, that it will give the reader an adequate initial view of the extent and complexity of the literature on this topic.

The author gratefully acknowledges the cooperation of Mr. Richard Young who thoroughly and painstakingly gathered and verified the bibliography; of Professor Harold Kalant for critical discussion of much of the material during its preparation, and of Mr. R. E. Popham for his continued interest, encouragement and editing of the manuscript.



## CONTENTS

Foreword	iii
Introduction	1
The Literature on Cannabis	3
Reviews of Selected Works	6
Boyce: Hemp (1900)	6
Meunier: Le Hachich (1909)	6
Brotteaux: Hachich, Herbe de Folie et de Rêve (1934)	8
Walton: Marihuana, America's New Drug Problem (1938)	9
Blatt: Chemical Constituents of Cannabis (1938)	11
Stringaris: Die Haschischsucht (1939)	12
Chopra & Chopra: Hemp-Drug Addiction in India (1939)	13
Adams: Marihuana (1941/42)	19
Mayor's Committee: The Marihuana Problem in New York (1944)	19
Todd: Hashish (1946)	24
Wolff: Marihuana in Latin America (1948)	25
Johnson: Indian Hemp (1952)	27
Murphy: The Cannabis Habit (1963)	28
Downing: Psychotomimetic Compounds (1964)	29
Grič: Chemical Research of Cannabis (1964)	29
McGlothlin: Hallucinogenic Drugs (1964)	29
Wolstenholme & Knight: Hashish, Chemistry and Pharmacology (1965)	30
Solomon: The Marihuana Papers (1966)	32
Subject Index	34



## INTRODUCTION

Cannabis is an annual plant which originated in Central Asia and gradually spread to many other areas of the world including the Western Hemisphere. It can grow wild or in the cultivated state in both temperate and hot dry climates but some of its botanical and chemical features differ according to the environmental conditions of growth. For this reason several species of the genus Cannabis were recognized in the past: sativa, indica, and americana. Today these are considered to be varieties of a single species.

Historically the plant has had considerable socio-economic significance for two main reasons. Under certain conditions of growth its stalk is rich in a fiber which, properly treated, can be used for the manufacture of rope and textiles. This was an important industry in the early American colonies, and farmers were fined if they failed to cultivate the plant. The English term 'hemp', the French word 'chanvre' and the Spanish 'cañamo' are used to designate the plant cultivated for this purpose. The other socially significant feature of Cannabis is its capacity to produce a resin, particularly around the flowering tops of the female plant, of striking pharmacological action. When this resin, or the parts of the plant coated with it, are eaten or smoked abnormal physical and mental effects occur which are experienced by many people as a highly desirable state of stimulation and euphoria. Cannabis has been used in this way for centuries in some societies, e.g. India. When so used, it is often referred to as 'hashish' in England and France, and in North America as 'marihuana' - a Mexican term of uncertain etymology.

Hashish is an Arabic word meaning herb, but it is used in contemporary English to refer to preparations of Cannabis, particularly of the more or less pure resin, of African or Asian origin. These preparations are usually considerably more potent than the marihuana grown in North America. The resin has been shown to contain a group of substances collectively known as cannabinoids or cannabinoids which include, among others, cannabiol proper, the cannabidiols, cannabidiolic acid and the tetrahydrocannabinols. So far, one of the latter is the only component found to produce the characteristic pharmacological action of Cannabis in man. An excellent detailed review of recent advances in the chemistry and synthesis of these substances has been written by R. Mechoulam and Y. Gaoni (Fortschr. Chem. organ. Naturstoffe 25:175-213, 1967).

It is believed that the use of Cannabis as a euphoriant spread from India to the Middle East and North Africa, where the habit has been widespread for a long time. In the 19th century the British learned of it from the Indians and the French from the North Africans, but its use for this purpose was not common at that time. Although, according to some authorities, the Spanish took the plant to Chile as early as 1545, and the English introduced it to the American colonies in the 17th century, this was exclusively for the production of fiber. How the Mexicans learned of the pharmacological effects of Cannabis is less well understood, but it is clear that they were responsible for the introduction of the knowledge to English-speaking North America in the 1920's and 1930's.

The nature of the acute effects of Cannabis in man and the fear of adverse consequences from its prolonged use have led, particularly during the 20th century, to legal restrictions on its use, or to outright prohibition in most countries.

The acute effects depend upon both the dose taken and the individual who consumes it. There is substantial agreement among competent observers that with the dose usually taken in North America, the effects upon most individuals are mild, and characterized principally by euphoria, heightened intensity of visual and auditory sensations, distortion of the sense of time and space, a tendency to passivity and relaxation, and physical symptoms initially characterized by sympathomimetic activity. However, some individuals may show untoward reactions characterized by anxiety and panic. The consensus is that the difference in effect depends essentially upon the pre-existing mental state of the user, and the setting in which the drug is taken. There appears to be no evidence that the use of the drug in itself causes crimes of violence, sexual arousal or antisocial behavior. But it has been emphasized by various observers that Cannabis, or any other drug producing disinhibition of behavior, may have such consequences in some individuals, depending upon their repressed drives and conflicts and upon the circumstances under which it is taken.

The character, intensity and time-course of the acute effects are also dependent upon the kind of preparation used and the route of administration. The effects of smoking marihuana cigarettes of North American origin appear promptly and are mild, short-term and easy to regulate. On the other hand, the effects following the ingestion of the more potent resins take longer to become manifest, are usually more intense and cannot be regulated once the dose has been ingested.





Thus, the problems directly related to the acute effects of Cannabis consist of variable and unpredictable aberrations of mood and behavior in susceptible individuals. The principal questions related to the consequences of chronic use are the nature of the dependence which may arise, and its connexion with the use of other dependence-producing drugs, the possibility of physical and mental damage to the individual, and the social significance of the habit in terms of work patterns, family relationships, etc.

Most observers agree that chronic users may discontinue the drug without any risk of physical withdrawal symptoms. It is frequently stated that there is no craving or severe psychic dependence upon the drug. However, there are very good case descriptions of individuals who have continued in the need to maintain a state of Cannabis intoxication for most or all of their waking period and whose social functioning is impaired without it. This appears to conform to the description of drug-dependence recommended by the World Health Organization.

There is still far too little information regarding other questions related to chronic use to permit sound conclusions, particularly in the context of North American society. Studies in India, North Africa and Brazil are the most thorough available to date, but all suffer from a lack of suitably matched control-populations of non-users. This is not to say that all of their conclusions are invalid. For example, the Chopras included groups of subjects using different doses and different preparations of Cannabis. Therefore, differences in effect which could be correlated with differences in dose or method of administration permit certain reasonable inferences about the actions of the drug. On this basis it seems clear that chronic smoking of Cannabis preparations may give rise to chronic pulmonary damage. However, this may not be due to the Cannabis principles themselves, but to non-specific irritants in the smoke.

Effects upon nutrition, resistance to infections, social effectiveness, and other aspects of health, generally appear to be related to the habitual dosage. It is suggested by some that the use of large doses results in a state of inactivity which impairs the individual's ability to attend to both his physical and social requirements. Other observers dispute this interpretation and suggest that the physical and social deterioration seen in some chronic users is a consequence of their socio-economic status, and that the heavy use of the drug is the result rather than the cause of their condition of life. It would appear that no valid conclusion to the effect that the chronic use of Cannabis is harmful or that it is not harmful can be drawn at present, particularly with respect to the pattern of use in North America. To settle this problem extensive studies are required, which take into account the doses, preparations, modes of use, and the characteristics and histories of the users.



## HISTORY OF THE LITERATURE ON CANNABIS

In 1951 the Bulletin on Narcotics of the United Nations issued a comprehensive list of publications on Cannabis that included a total of 1104 references. A more complete bibliography of 1860 titles was prepared at the request of the Commission on Narcotic Drugs in 1965. It includes, in addition, a useful subject index compiled by N. B. Eddy, Consultant on Narcotics of the Department of Health, Education and Welfare, U. S. A. Revised for errors and duplications, and brought up to date, the bibliography now includes nearly 2000 titles of which 377 appeared before 1900.

The bibliography prepared by the United Nations is all-inclusive in character, covering the periodical literature of the 19th and 20th centuries, books, pamphlets, theses and ancient writings from various cultures. It contains historical and literary works, a substantial number of League of Nations and United Nations documents, patents and a number of repetitive articles of a purely didactic nature without any original material. For these reasons it is not possible to tell at present exactly how many of the works listed are of a sound medical or scientific character, but these probably do not amount to more than half of the total bibliography.

The table below shows the language distribution of the titles in our revision of the U. N. bibliography:

English	-----	1073
French	-----	309
German	-----	232
Portuguese	-----	116
Spanish	-----	85
Italian	-----	38
Others	-----	<u>111</u>
Total	-----	1964

If it is considered that Cannabis, in one form or another, has been used by man since the beginning of recorded history, a total of 2000 publications seems a very small number indeed. This is particularly so since the effects of the drug on man can be quite dramatic and, furthermore, the drug has been and is being used throughout the world by millions of people. By comparison, the literature on other psychotropic drugs is much greater. For example, the number of selected scientific papers in the Classified Abstract Archive of the Alcohol Literature stood at 11,847 at the end of 1966, and the literature on the amphetamines, (introduced as recently as the late 1920's) comprises substantially more than 2000 items at present. In the recent past scientific publications on Cannabis have appeared at the rate of about 20 per year while on the amphetamines the rate is over 100. Although it is difficult to establish with certainty the reasons for this apparent neglect, certain conjectures are possible.

In the first place, until quite recently Cannabis has not been widely used as a psychotropic drug in Western, scientifically oriented countries. If it had been, no doubt much more would have been written about it. Large scale use has been confined mainly to certain areas of Asia, Africa and Latin America. Secondly, to date Cannabis has not been proven to have any significant therapeutic applications. It is clear that scientific interest in a drug practically devoid of healing powers or other practical applications is not apt to be great. Thirdly, studies of Cannabis have been (and still are to some extent) hampered by the complexity of the chemistry of its active principle or principles. In other words, for a long time scientists had to make do with the raw plant, various crude concentrates or ill-identified chemical extracts. The tetrahydrocannabinols were not prepared and identified as pure compounds having Cannabis-like action until the early 1940's. The absence of a pure and well-defined chemical undoubtedly discouraged more eager investigation in this field; the crude extracts are notoriously unstable, inconsistent in potency and difficult to prepare for administration. Lastly, the major and most interesting effects of Cannabis are of a subjective nature, leaving the scientist with little to observe or measure, and largely unable to profit from animal experimentation.

A more detailed examination of the bibliography on Cannabis (see graph) indicates, however, that interest in the field has waxed and waned during the past hundred years or so. The graph shows four discrete upsurges of interest between 1840 and 1965. The first occurred in the 1840's and 1850's in Europe, especially in England and France. Apparently this was the result of the publication of two books on Cannabis within three years of each other. The first was a work by O'Shaughnessy entitled The Bengal Dispensatory and Companion to the Pharmacopoeia which appeared in London in 1842. In it he described his observations of the medicinal uses of Cannabis in India. This stimulated interest in the potential therapeutic value of



Cannabis. The second was a 431 page book by the French neurologist J. -J. Moreau de Tours published in 1845 under the title of *Du Hachich et de l'Aliénation Mentale*. He carefully described the characteristic acute Cannabis intoxication, noted its similarity to the naturally occurring psychoses, and went as far as to propose its use in the experimental study of these conditions and in their treatment. Thus Moreau de Tours may be said to have anticipated the concept of the "model" or experimental psychoses by nearly 100 years. These two publications not only aroused the interest of the medical profession but also - particularly Moreau de Tours' book - the interest of Parisian literary and intellectual circles in the use of the drug for purely hedonistic purposes. Some of the best literary works on Cannabis belong to this period, such as Baudelaire's famous Les Paradis Artificiels.

The second marked increase in the number of publications on Cannabis occurred in 1880 and was more or less maintained for the next 50 years. The literature of this period, particularly of the 1880's and 1890's, reveals a renewed interest in the therapeutic applications of the drug and a certain degree of attention to the chemistry of its active principle. But little came of either of these endeavors. Cannabis as a therapeutic agent was eventually abandoned and its chemistry remained largely a mystery until the 1940's.

The third period of increased attention to Cannabis is that between 1930 and 1950, but particularly the decade between 1935 and 1945. The publications during this period are mainly American and arose from the fact that for the first time the lay use of Cannabis became widespread in certain sectors of American society. Some of these publications are totally worthless from a scientific point of view. This is the propagandistic literature intended to "inform" the public about the new social "evil"; it is unobjective, biased, and full of inaccuracies. But, at the same time, some of the best scientific studies ever made on Cannabis belong to the period and encompass its chemistry and pharmacology, the psychological and psychiatric implications of its use, and its possible relationship to criminal behavior. Another factor that stimulated interest in the late 1930's was the increasing concern with the international traffic in opium and other addicting drugs, and the intervention of such agencies as the League of Nations in these matters.

The current public concern with Cannabis in North America needs no further comment. This has already begun to be reflected in the scientific literature as shown in the graph, and interest in the field shows every sign of continuing at an accelerated pace. Improved methods for the isolation, identification and synthesis of the chemical constituents of the plant will no doubt stimulate sound pharmacological and psychological work. This in turn should ultimately provide a better understanding of the basic factors to be taken into account in assessing the social and personal consequences of Cannabis use.

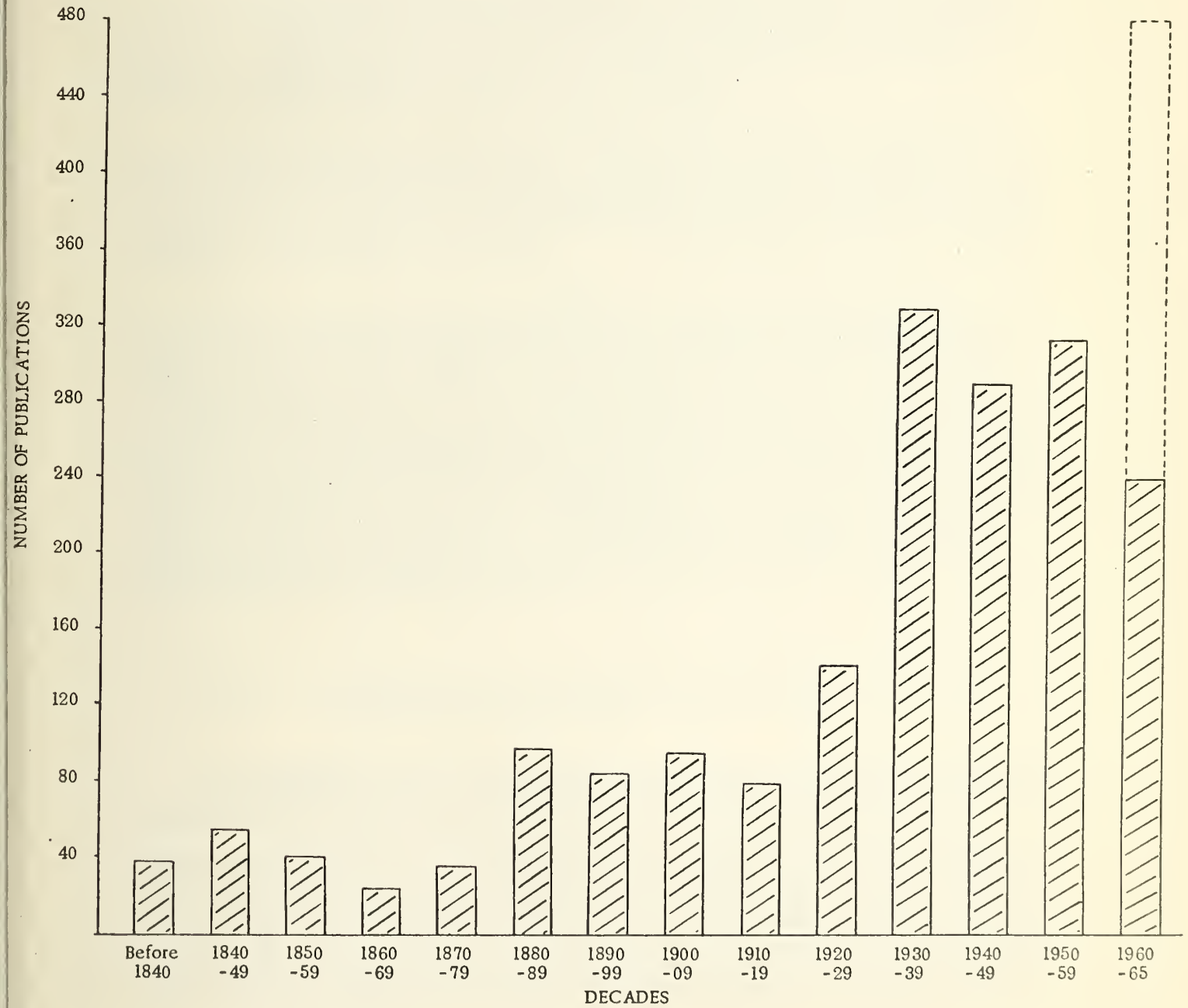
Despite the periodic upsurges of concern in the literature, it should be stressed that both the quantity and quality of studies of Cannabis are far below those of most other drugs of similar type. This is especially noteworthy when its longstanding use by the peoples of many countries is considered. The latest comprehensive scientific monograph on Cannabis is the book by Walton entitled *Marihuana - America's New Drug Problem* which was published in 1938. It is felt, therefore, that an up-to-date, comprehensive and scientifically unbiased monograph on this most interesting drug is needed. It should not only bring together whatever knowledge there is, but it should also delineate clearly the many aspects of Cannabis use and action, about which little or nothing is known.







# LITERATURE ON CANNABIS





REVIEWS OF SELECTED WORKS

Boyce, S. S. Hemp (Cannabis sativa). A Practical Treatise on the Culture of Hemp for Seed and Fiber with a Sketch of the History and Nature of the Hemp Plant.  
New York: Orange Judd 1912, 112 pp. [First published in 1900]

The author of this small monograph, first published in 1900, was a man with a cause, since he considered that: "Hemp is the king of fiber-bearing plants, - the standard by which all other fibers are measured". The book, divided into 13 chapters, deals almost exclusively with the various factors that influence the cultivation of hemp in North America and with the techniques for the manufacture of hemp fiber. The pharmacological properties of the hemp resin are mentioned only incidentally. Consequently, this work is mostly irrelevant to the subject of Cannabis as a drug. However, in the latter regard, the monograph is of indirect interest for what it does not say.

Chapters IV and V (pp. 35-52) give a good historical account of the scope of the hemp industry in North America from the earliest colonial days. The industry was considered so important that in 1662: "Virginia awarded bounties for hemp-culture and manufacture, and imposed penalties upon those who did not produce it". However, at the beginning of the 18th century the hemp industry in the American colonies came upon bad times as a result of intervention by the British government. The Colonists were prohibited from manufacturing hemp, because the British were anxious to stimulate such activities in Ireland. According to Boyce it was this that "..... finally brought on the war of the American Revolution".

It is apparent from his account that the farmers who grew hemp for several centuries for its fiber and its seed either were unaware of its intoxicating effects, or if they were, did not choose to use it for such purposes. It is generally true that there is an inverse relationship between the fiber and the resin content of Cannabis. However, research conducted principally by the U. S. Department of Agriculture, has demonstrated that North American grown Cannabis is pharmacologically active in varying degrees. It is apparent, therefore, that it was the habit of smoking marihuana rather than the cultivation of the plant that was introduced into the U. S. A. from Mexico in the mid twenties. It is a reasonable assumption that if such a habit had existed earlier it would have been mentioned in a detailed account such as that of Boyce. Circumstantial evidence of another type would appear to support this conclusion. Thus, the pharmaceutical preparations of Cannabis included in the U. S. Pharmacopoeias of the 19th and beginning of the 20th century had to be made from Cannabis indica, that is, from Cannabis grown and harvested in India. Furthermore, the few accounts of the use of Cannabis as an intoxicant by sophisticated American intellectuals of the 19th century, such as Ludlow and Bayard Taylor speak of hashish or of tincture or extracts of Cannabis, rather than of American grown hemp. It is highly probable therefore, that the pharmacological activity of the flowering tops of American Cannabis was not known to the farmers who grew the plant for its fiber and its seed.

Meunier, R. Le Hachich. Essai sur la Psychologie des Paradis Ephémères. Paris: Librairie  
Bloud 1909, Third Edition, 218 pp.

This monograph is a lucidly, at times elegantly, written critical review of the early literature on Cannabis. The bibliography of 98 references includes 51 works in French, the rest being mostly English, German and Italian. The book is divided into 7 chapters and a section of general conclusions.

Chapter 1 - Le Hachich (pp. 1-27). Deals with the botanical description of Cannabis, its geographical distribution, the early European descriptions of the plant and its effects, and the publication of Moreau de Tours' work on Hashish in 1845 which, in Meunier's view, marked the beginning of scientific interest in hashish in Europe since it stimulated chemical, physiological, pharmaceutical and therapeutic studies of the drug. In his words: "Finally, the year 1845, marks the capital date in the European history of hashish". The chapter also contains a description of the various preparations of Cannabis used in India, the Middle East and North Africa, the active preparations available in France and the various attempts to isolate the active principle. He concludes: "The multiplicity of products demonstrates our ignorance of the active principle of hashish intoxication".



Chapter 2 - Les Hachichins (pp. 28-59). Discusses the reasons that impel people to take intoxicants: different for the primitive and unsophisticated, on the one hand, and for the artist, on the other. He develops the thesis that the French poets of the 19th century were highly influenced in their descriptions of hashish intoxication by two literary works with which they were well acquainted, namely, Homer's passage on Nepenthe in the *Odyssey* and Marco Polo's description of the delights induced by the drug on the followers of the Old Man of the Mountain. According to Meunier these authors, particularly Gautier and Baudelaire, idealized their versions of the intoxication to suit their own expectations: "They emphasized in particular the initial euphoria, they re-organized the incoherence of the delirium, and nearly ignored the accompanying melancholic depression". He goes on to demonstrate that "..... hashish gave to two poets, who left for us perfect descriptions of these effects, what they expected of it; to the one [Gautier] images of unbelievable beauty, and to the other [Baudelaire] the strange taste of the unknown that he sought in everything". His main thesis is that suggestion, similar to that seen in hysteria, is an important characteristic of the intoxication and that this, together with the personality of the subject, the dose, the method of administration and the type of preparation taken, determines the various subjective states observed.

Chapter 3 - L'Ivresse Hachichique (pp. 60-88). Based on the scientific observations of hashish intoxication by Moreau de Tours (1845), Richet (1887), Lange, Binet-Sangle (1901) and by himself, Meunier concludes that the symptoms include: 1) Psychic phenomena such as hallucinations, delirium, illusions, illusions of time and space, dissociation of ideas, "aproséxie", excitation, sleepiness, amnesia and hypermnnesia, suggestibility, and euphoric or melancholic hypermotivity. 2) Sensory disturbances: hyperexcitability, hyperesthesias, and anesthetics. 3) Neuro-muscular disturbances: hypermotility, convulsive movements, spasmodic laughter, etc. 4) Respiratory, circulatory and digestive disturbances (increased appetite with small doses, decreased appetite and dyspepsia with large doses). 5) Various secretory disturbances. 6) Sexual phenomena such as excitation with small doses and anaphrodisiac effects with large doses, but especially in states of chronic intoxication. The influence of the dose on the outcome of the acute intoxication is stressed.

Chapter 4 - Les Recherches et les Théories Neuro-biologiques (pp. 89-113). Describes the experimental studies by Moreau de Tours (1841) in rabbits, Liouville and Voisin (1873) in guinea pigs, Hay (1873) in frogs, Roux (1886) in chickens, frogs, guinea pigs and pigeons, Richet (1887) in dogs and Binet-Sangle's (1901) bizarre theory that hashish acts by contracting, dilating and deforming the neurones of the cerebral cortex. Meunier regrets that these experimental observations are too few to permit any conclusions and dismisses Binet-Sangle's theory as nonsense.

Chapter 5 - La Folie Hachichique (pp. 114-135). Discusses the problem of hashish psychoses. It is pointed out that this form of insanity is practically unknown in the West, but generally recognized in the Orient, although the objective data and literature on the subject are very scant. The author claims, on the basis of what is known about Baudelaire's life and of his own writings, that the notion that the poet suffered from hashish psychosis is an untenable "legend".

Chapter 6 - Le Hachich, le Rêve et la Folie (pp. 136-158). This chapter reviews Moreau de Tours' book, particularly his theory that dreams, insanity and acute hashish intoxication are identical mental phenomena. Moreau de Tours felt that insanity could be studied only if it could be produced experimentally and that hashish intoxication provided the means. His studies led him to conclude that what he called the "primordial fact" i. e. a state of excitation with dissociation of ideas through weakening of the attention was present in dreams, insanity and hashish intoxication and that, therefore, these mental states were identical. Meunier critically examines this theory and concludes that although certain components of these mental states are identical, the states themselves are not. He notes that the comparison is made particularly difficult by the fact that insanity is an ill-defined concept comprehending several little understood entities. He ends the chapter by suggesting that it can be argued equally well that there are important similarities between hashish intoxication and hysterical states, especially suggestibility and auto-suggestibility.

Chapter 7 - L'Action Thérapeutique du Hachich (pp. 159-194). This is a critical examination of the literature on the therapeutic uses of hashish. The author concludes that many of these trials and claims are practically worthless because of the unreliability of the preparations used, because of lack of controls (the course of the illness might have been the same without the treatment), and because in some instances other drugs were administered simultaneously. In most cases the results themselves were quite inconstant and unreplicable. He feels that hashish is not indicated in the depressions because of its transitory effect and of the secondary depression that occurs following its administration, and that it is not as good an hypnotic as other drugs because of the initial stage of excitation that it produces. In his opinion its main usefulness may lie as an adjuvant to psychotherapy to enable the expression of subconscious mental content, particularly in hysteria. The following paragraph is as topical today as it was in 1909: "Besides, it remains very difficult, to say the least, to cure a depressive mental state by the administration of any drug. Almost by definition the drug will act as a stimulant only during the acute intoxication. As it is eliminated, the previous state re-appears gradually and superimposed upon it will be the fatigue induced by the artificial excitation which the organism naturally rejected".





General Conclusions: (pp. 195-200). 1) Hashish produces a state of intoxication characterized by a stage of excitation accompanied by delirium with lucid intervals, and by a stage of depression. 2) Repetition of the experience often results in a chronic condition which may lead to a psychosis, the drug acting apparently as a poison of the cerebral cortex and of the bulb. 3) There is no evidence that hashish improves the intellectual faculties, as has been claimed by some amateurs, but rather it enhances the emotions. 4) The enhanced suggestibility and auto-suggestibility distinguish hashish intoxication from insanity with which it has been equated. Hashish intoxication reveals the subconscious and this, together with the enhanced suggestibility, may be useful in psychotherapy. 5) Use of hashish may be tolerable for some individuals under certain circumstances but generally the author is against it mainly because of the shallow emotional reactions that it produces.

Brotteaux, P. Hachich, Herbe de Folie et de Rêve. Paris: Vega 1934, 193 pp.

This monograph was based on a review of 408 references\* as well as on the personal experience of the author, particularly with respect to the psychological effects of the drug. It is organized in 5 chapters and a set of 5 major conclusions. The bibliography, arranged chronologically at the end of the book, tells an interesting story by itself.

Chapter 1 - Etude Historique (pp. 9-25). This is a chronological account of the major works on Cannabis beginning with the Zend-Avesta (where, according to Brotteaux, mention is made for the first time of the euphoriant properties of Cannabis) and the Histories of Herodotus, and ending with the writings of French authors of the 1930's. The account is good and clearly based on consultation of the primary sources. Brotteaux welcomes the legal restrictions introduced in France in 1930 concerning the lay use of Cannabis since "..... all these substances, after a period of euphoria, generally lead their users to insanity and death". Its use should be restricted to therapeutics and research in pathological psychology.

Chapter 2 - Botanique et Matière Médicale (pp. 27-77). The first 9 pages of this chapter contain a rather complete description of the botanical features of Cannabis and a discussion of its mode of cultivation in various areas of the world and of how such factors as soil and temperature affect both its characteristics and its content of the pharmacologically active principle. The rest of the chapter deals, country by country, with the manner of use of Cannabis, the manufacture of crude products, the social and religious implications of its use, the physical and mental effects of chronic use and the measures taken by various governments to regulate or suppress its consumption. The areas covered most thoroughly are: India and Central Asia, Turkey, Syria, Egypt, Greece, Tunisia, Algeria and Morocco. Under the heading of "Other Countries" a little is said about the use of Cannabis in Black Africa, Mexico, Brazil and the United States. The sections on Turkey, and on Tunisia, Algeria and Morocco contain some first hand observations. The chapter concludes with the remark that in Europe and North America, where the legal restrictions are severe, there are very few individuals who use Cannabis solely for the intoxication that it produces.

Chapter 3 - Étude Chimique (pp. 79-88). This is a rather complete historical review of the field. It covers the period from the middle of the 19th century, when the first attempts to isolate the active principle of Cannabis were made, to the works of Casparis in the 1920's. Brotteaux concludes that cannabinalol, as had been claimed by Wood, Spivey and Easterfield in 1896, is the active principle. This is a rather curious conclusion since the bibliography includes both the 1898 paper by Wood, Spivey and Easterfield, in which they demonstrated that their original "cannabinalol" was a mixture and reported the isolation of pure cannabinalol, and the paper by Marshall in the same year indicating that pure cannabinalol "... was much less active, physiologically, than the parent substance". The papers published by Cahn in the early 1930's, which confirmed that pure cannabinalol was not physiologically active, were not included in Brotteaux's bibliography.

Chapter 4 - Étude Pharmacodynamique (pp. 89-135). On the basis of personal observation of acute Cannabis intoxication (both in himself and in others) and information obtained from the literature, Brotteaux discusses the most prominent mental features of the phenomenon. The chapter begins with Moreau de Tours' description of the various stages of intoxication. This is followed by two classical subjective descriptions: Gautier's and Baudelaire's. Consideration of his own experience and that of others led Brotteaux to the conclusion that the main features of the Cannabis intoxication were: 1) weakening of the will; 2) a state of double consciousness; 3) coming to the fore of unconscious material; 4) pronounced suggestibility; and 5) ability to recall the experience.

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\* This list of references on Cannabis, together with those prepared by Walton and by Wolff was the basis on which the first (1951) U. N. bibliography on Cannabis was prepared.





Each one of these points is discussed and documented in great detail. Perhaps one of the most significant sections of the discussion concerns the effect of suggestion on the course of the intoxication. In Brotteaux's view the mental content depends partly on the make-up of the individual, but also, and to an important extent, on the sensory input provided by the environment. In his words: "..... if external sensations are lacking, if, for example, the individual is alone, the delirium is poor". His main conclusion is that acute Cannabis intoxication "..... is characterized by a partial, but not complete inhibition of the conscious state, and by a very pronounced freeing of the unconscious state". This suggests the possible use of Cannabis in psychology, psychoanalysis and psychotherapy. The chapter ends with a discussion of the chronic effects of the use of Cannabis and the author concludes: "..... the prolonged use of hashish often provokes mental problems; however, the least noxious way of absorbing the drug is by smoking. Complete prohibition of this way of using the drug in countries where the habit is traditional, is not advisable, since it would be replaced by alcohol and other narcotics which are much more dangerous to the mental health of the natives".

Chapter 5 - Pharmacologie (pp. 135-159). This chapter is divided into four sections: I: Brief description of the international agreements (League of Nations) concerning the control of traffic and commerce in Cannabis and its preparations. II: A list of the preparations of Cannabis currently included in the Pharmacopoeias of various countries. III: Discussion of the available methods of assay of Cannabis preparations, i. e. determination of the resin content (which is useful only when dealing with fresh products) and the dog ataxia method which gives a more direct indication of the content in active principle. IV: Brief description of the therapeutic uses. Brotteaux concludes that many of the claims made in the past with respect to the therapeutic usefulness of Cannabis appear unwarranted, but that since the main action of the drug is psychological - in the sense that it brings to the fore unconscious material - its possible use as an adjunct to psychoanalysis in the treatment of the neuroses should be further explored.

Walton, R. P. Marihuana - America's New Drug Problem. A Sociologic Question with Its Basic Explanation Dependent on Biologic and Medical Principles. Philadelphia: Lippincott 1938, 223 pp.

As far as the writer is aware, Walton's monograph is the most recent comprehensive review of the literature on Cannabis. It was the author's misfortune that the six or seven years following his publication saw one of the most active and fruitful periods of experimental investigation in this field, particularly with respect to the chemistry of Cannabis components and to some extent their pharmacology. For this reason whole sections of the book are now obsolete. However, certain chapters, such as those on the history of the use of Cannabis as a drug, or those dealing with its subjective effects are excellent and as useful today as they were when written. The bibliography of 438 references, numbered in order of appearance and classified by chapters, is most valuable, as is the compilation of terms employed throughout the world to designate the plant or crude preparations of it. Despite the use of the value-judgmental term "vice" to refer to the Cannabis habit, and with the exception of chapters 3 and 8, the approach throughout is generally critical and objective. Chapter 3, which deals with the extent of Cannabis use in the U. S. A. at the time, was not written by the author, but by the Commissioner of Public Safety and the Assistant City Chemist of New Orleans. They were not able to maintain a critical and objective approach. Chapter 8 deals with the consequences of the chronic use of Cannabis and draws conclusions respecting tolerance, addiction and crime-inducing effects that do not seem warranted by the facts available to the author.

Despite these shortcomings Walton's monograph is certainly the best single source of information on Cannabis in the English language. At the very least it can bring the reader up to date to 1938 in 223 short pages. A brief summary of each chapter follows.

Chapter 1 - History of the Hashish Vice (pp. 1-18). The author examines historical, religious and literary writings from various countries and civilizations to establish when and by whom the plant, its narcotic properties and its widespread use were first recognized. Evidence from Chinese, Indian, Persian, Assyrian, Greek and Roman writings leads Walton to conclude that Cannabis as a plant was recognized "..... almost from the beginning of history". Later, there is evidence that certain plants, not positively identified as Cannabis, were used to produce euphoria. Information from Arabia and Egypt covering roughly the period between 950 A. D. and the beginning of the 19th century leads Walton to conclude that "..... it is clear that the hashish vice has flourished conspicuously in these countries for at least 1000 years". European references to Cannabis up to the beginning of the 19th century suggest that there was some knowledge of the actions of Cannabis, based mainly on Asian and African reports, but no generalized propagation of the habit. According to Walton, the contemporary use of Cannabis in Europe apparently reached the continent from Asia, via Africa and the Americas.



Chapter 2 - Distribution of the Hashish Vice (pp. 19-26). This chapter contains a brief account of the prevalence of Cannabis consumption in India, Iraq, Palestine, Persia, Turkey, Russia, Greece, Northern, Central and Southern Africa, South and Central America, Cuba, Mexico, Canada and England. Walton concludes: "A point brought out very clearly by this collection of reports is that the vice still flourishes in every country in which it has once been established. This is despite the fact that in some of these countries, attempts have been made for almost 1000 years to stamp out the practice".

Chapter 3 - Present Status of the Marihuana Vice in the United States (pp. 27-39). [By F. R. Gomila, M.D., Commissioner of Public Safety, City of New Orleans, and M. C. Gomila Lambou, M.S., Assistant City Chemist]. An account is given of the extent of marihuana use in 21 American states, with special emphasis on Louisiana and New Orleans. This is based primarily on newspaper and magazine reports and on information provided by police and government authorities on arrests for possession and confiscation of cigarettes and plants. The authors conclude that the use of marihuana is widespread in all areas of the country. The frequency of use among school children is considered particularly alarming. The "disastrous consequences" of the habit in some individuals are: the commission of premeditated and unpremeditated crime; a general lowering of morals and restraint; "..... a certain degree of addiction when the drug is used for an extended period of time", and a high incidence of addiction to heroin in former marihuana users. For these reasons the authors consider "..... that the situation is of the utmost gravity and one which calls for drastic measures of eradication".

Chapter 4 - The Plant Source - Botanical Descriptions (pp. 40-46). The description of the botanical characteristics of Cannabis is based mainly on the observations of Dewey, Prain and Bouquet; the question of the sexuality of the plant on those of Schaffner. The distribution of cultivated Cannabis throughout the world is briefly dealt with. The chapter ends with an account of the history of cultivation of Cannabis for fiber in the United States. Walton notes that although the hemp grown for this purpose since about 1632 had substantial pharmacological activity, it does not appear to have been used as a drug.

Chapter 5 - Technique of Ingestion or Administration (pp. 47-55). The main methods of administration are smoking and ingestion. The crude resin may be smoked in ordinary or water pipes. In modern times cigarettes made of leaves and flowers alone or in combination with tobacco are more generally used. The products that are ingested are generally water or alcohol infusions, or solid preparations, often mixed with a variety of ingredients. Most of the chapter is devoted to a discussion of the various methods of parenteral administration for experimental purposes.

Chapter 6 - Description of the Hashish Experience (pp. 56-114). The description of the effects of Cannabis in humans is divided into four sections: 1) Subjective descriptions by writers and poets. This is based primarily on extensive quotations from Gautier (1843), Dumas (1845), De Quincey (1845), Baudelaire (1860), David Urquhart (1850), Bayard Taylor (1854), from Ludlow (1857) to whom 15 pages are dedicated because he "..... contributed the most remarkable description of the hashish effects", Hector France (1900) and Van Vechten (1922). The quotations are tied together by pertinent and interesting comments but no specific conclusions are drawn from the material. Walton considers the often bizarre and fantastic descriptions of special significance because "..... these are probably the most vivid accounts of the peculiar mental fascination which has served to fix this drug habit in the lives of millions of individuals". 2) Subjective descriptions by physicians and scientists. This is an account of the subjective reactions to Cannabis of 17 physicians who reported their experiences between 1845 and 1923. 3) Objective descriptions by physicians. This describes the observations of 24 authors on the mostly unpleasant reactions of their patients to Cannabis. Here the emphasis is on objective, especially physical, symptoms. Most of these reports appeared before 1900 during the period of therapeutic popularity of the drug. 4) Objective descriptions by psychiatrists. This section reviews experimental studies conducted by psychiatrists such as Fraenkel and Joel (1927), Kánt and Krapf (1928 and 1930), and Beringer, Bayer and Marx (1932) in Germany who observed the effects of Cannabis on normal and psychotic individuals under experimental conditions; Stringaris in Greece (1933 and 1935), and Skliar and Iwanow in Russia (1932) who experimented on chronic users; Dostas and Zis (1929) in Greece who conducted experiments on normal individuals and on chronic users, and finally Bromberg (1934) in the United States who studied the psychiatric aspects of Cannabis intoxication.

Chapter 7 - Acute Effects (pp. 115-127). On the basis of the evidence already presented Walton gives a list of the most prominent effects of Cannabis, roughly in their order of appearance: sensory and motor anesthesia, analgesia, distortion of time and space, dream content, euphoria and apprehension, alternating character of effects, double-consciousness, uncontrolled and criminal violence, hypermotility, hypersensitivity, musical performance, aphrodisia, thirst, appetite, metabolic effects, pupillary changes, diuresis, circulatory effects and somnolence. The chapter also includes brief discussions of after-effects, effects of overdosage and a comparison of the effects of Cannabis and mescaline.

Chapter 8 - Chronic Effects (pp. 128-150). The questions of tolerance, withdrawal symptoms, addiction, and mental and physical deterioration in chronic users are discussed. Walton draws the following conclusions: Some degree of tolerance occurs after excessive and prolonged use, but not as regularly or to the same extent as with the opiates. Physical withdrawal symptoms are limited to extreme cases, but the mental fascination





exerted by the drug "..... is peculiarly compelling". In his view, however, "..... the most serious aspect of the problem is the extent to which the vice contributes to juvenile delinquency, serves as an introduction to other more potently addicting drugs, and conditions the petty criminal to perform truly desperate acts of violence". The causal role of Cannabis in the mental and physical deterioration of chronic users in Asian and African countries is probably exaggerated because no due account has been taken of the user's environmental conditions. A Cannabis psychosis is probably a clinical entity but its identification in the American context is lacking.

Chapter 9 - Pharmacological and Chemical Considerations (pp. 158-187). In this chapter the chemical characteristics of popular and pharmaceutical preparations of Cannabis and their pharmacological activity are described and discussed. The popular preparations include the crude drug, i. e. flowers and leaves which are usually smoked; resinous exudates such as charas and hashish obtained mainly in hot dry climates; extracted preparations such as butter and alcohol extracts common in Asia and Africa, and fluid and solid alcoholic extracts used in orthodox medicine; special pharmaceuticals, e. g. cannabion, tannate of cannabine, neurosine, which are mostly outmoded. The section ends with a brief description of the amount of extractable material in the crude preparations and in the resins.

Methods for identifying Cannabis include the microscopic examination of the crude plant and of the resin, the Beam test and its modifications, and other color reactions. They are described and evaluated. The pharmacological activity of the crude drug and the relative potency of male and female plants is briefly dealt with. The major bioassay procedures available are discussed. These include the dog ataxia method, the assay based on corneal anesthesia in rabbits and the procedure based on the enhancement of the hypnotic effect of barbiturates by Cannabis in mice.

Under the heading: "Chemical Composition of the Active Material", Walton reviews the attempts made up to that time to isolate and identify the active principle of Cannabis. The most active semi-pure products obtained are the vacuum distillates of the more potent extracts often referred to as "cannabinol". Although some workers have thought these to be pure substances, Walton considers this doubtful. The characteristics of various derivatives and degradation products obtained from these distillates and of pure cannabinol are described. Walton concludes: "In all probability, the chemical constitution of this unique substance is not going to be definitely recognized until there is a coordinated investigative program in which the chemical alterations are guided by accurate measurements of physiologic activity".

Chapter 11 - Nomenclature (pp. 188-195). In this section Walton has endeavored to compile a lexicon of Cannabis. The first part gives a list of 180 terms used in various areas of the world to designate the plant or the crude drug, as well as the language to which each belongs and the authority from which it was obtained. The second part gives a list and a brief description of 63 folk preparations of Cannabis, and the third provides some terms associated with the use of Cannabis in the American vernacular.

Blatt, A. H. A Critical Survey of the Literature Dealing with the Chemical Constituents of Cannabis sativa. J. Wash. Acad. Sci. 28:465-477, 1938.

This is a good review of the chemistry of Cannabis as it stood in 1938. However, one of the most active and profitable periods in the study of Cannabis chemistry took place in the following four or five years, mainly as a result of the work of Todd et al. in England (Experientia, 1946) and of Adams et al. in the U. S. A. (Harvey Lectures, 1941/42). As a result the review promptly became outdated. Nevertheless, it contains sound and detailed discussions of certain important topics. These include the work of Wood, Spivey and Easterfield in Cambridge that led first to the preparation of a purified red oil, thought to be a pure compound which they labelled "cannabinol". These researchers also succeeded in isolating from organic solvent extracts of Cannabis three other compounds, a terpene, a sesquiterpene and a paraffin hydrocarbon (n-nonacosane) which did not have any physiological activity. Further work with "cannabinol" led to the isolation of a crystalline acetate from which pure cannabinol was obtained. It proved to be physiologically inactive.

The partial elucidation of the structure of cannabinol, due mainly to the work of Cahn, is discussed in detail. The rest of the review consists of a full description of the physical and chemical properties of "crude cannabinol". In Blatt's words: "The chemistry of crude cannabinol has been described in detail because the active principle or principles of Cannabis are present in this material and because, after removal of pure cannabinol from the crude, the activity is found in the residue. Consequently the point of attack in the isolation and study of the active principle of Cannabis must be crude cannabinol from which pure cannabinol has been removed". Blatt calls attention to the fact that for over 30 years the problem has baffled experienced chemists because crude cannabinol behaves in many respects as a pure substance. The review ends with a brief discussion of the Beam test and of the new test described by Duquenois and Moustapha for the identification of Cannabis.





Stringaris, M. G. Die Hashischsucht. (Psychopathologie-Klinik-Soziologie-Kriminologie).

Berlin: Springer 1939, 100 pp.

A thorough evaluation of this monograph was not possible for the writer at the present time because a full translation was not available.\* However, examination of the table of contents suggests that it is a comprehensive review of the clinical, psychiatric and sociological implications of the chronic use of Cannabis. The bibliography includes more than 200 references and the original clinical material consists of 25 detailed case histories observed in Greece. A translation of the table of contents follows.

Part One. GENERAL INFORMATION ABOUT THE HASHISH HABIT	-----	1
I. Extent and Technique of Use of Hashish	-----	1
1. The Significance of Hashish as a Folk Intoxicant	-----	1
2. Observations on the Present Extent of Hashish Use	-----	4
(a) India	-----	6
(b) Syria, Afghanistan, Baluchistan & Turkestan	-----	7
(c) Persia	-----	7
(d) Russia	-----	8
(e) Turkey	-----	8
(f) Egypt	-----	9
(g) The Rest of Africa	-----	11
(h) Mexico	-----	12
(i) Greece	-----	13
3. Customs and Practices of the Hashish Use	-----	16
(a) Forms of Hashish Intake	-----	16
(b) The Technique of Hashish Smoking	-----	17
(c) Groups of Hashish Smokers	-----	19
(d) Doses Used	-----	23
II. Clinical Observations on the Effects of Hashish	-----	24
1. Forms of Intoxication Produced by Direct Action of Hashish	-----	24
(a) Earlier Classifications	-----	24
(b) Acute Hashish Intoxication	-----	25
The First Intoxication	-----	26
A Single Intoxication after Repeated Use of Hashish	-----	27
Prolonged Intoxication	-----	32
(c) Differential Diagnosis of Hashish Intoxication	-----	39
2. Hashish Psychoses	-----	39
(a) Previous Observations	-----	39
(b) Episodic Confusional States	-----	43
(c) Protracted or Chronic Hashish Psychoses	-----	44
(d) Hashish Dementia	-----	46
(e) Simultaneous Occurrence of Hashish Intoxication with Endogenous Psychosis	-----	46
Summary	-----	47
III. Concepts of Intoxication and Psychoses Especially in Relation to the Problems of Hashish Action. Causal Relations	-----	48
1. Clinical Nature of the Intoxication	-----	48
2. Etiology of Hashish Psychoses	-----	51
IV. Sociological and Criminological Consequences of Hashish Addiction and the Fight Against Them	-----	55
(a) Work	-----	55
(b) Family	-----	56

\* pp. 24-39 are available in English in the A. R. F. Archive.



(c) Social Life	- - - - -	56
(d) Crime	- - - - -	58
(e) Peddling and Smuggling of Drugs	- - -	60
(f) Control Measures	- - - - -	63

Part Two. CASE HISTORIES	- - - - -	66
Bibliography	- - - - -	97

Chopra, R. N. & Chopra, G. S. The Present Position of Hemp-Drug Addiction in India.

Calcutta: Indian J. Med. Res. [Supplementary Series],

Memoir No. 31, 1939, 119 pp.

The use of Cannabis in India for medicinal, religious, social and personal purposes has existed for centuries. Official control of the use of the drug began as early as 1881 when the British government passed an Act restricting Cannabis consumption. On the recommendation of the Hemp Drug Commission of 1893-94 another Act was passed in 1896 which entitled the government to assume complete control over the cultivation, preparation, import, export and transportation of the plant and its preparations. For these two reasons, i. e. long-term use in a culturally acceptable context and government regulation of such use, studies of the characteristics and implications of Cannabis use carried on in India are of particular interest. One of the best examples is the present volume, which deals with many aspects of the subject including an examination of 1238 chronic Cannabis users. Since the authors also made a study of 600 cases of mental illness attributed to the use of the drug, the results of which were published separately, their familiarity with the topic seems broad indeed.

The volume gives an overall picture of the historical, sociological and medical features of Cannabis consumption in India and a detailed assessment of the situation in the 1930's. But, for the most part, it does not relate these features to comparable situations elsewhere. Furthermore, certain aspects of the clinical, field and experimental studies are subject to criticism in the light of current scientific procedures. However, despite these limitations, the monograph is of great value in that it presents a very comprehensive picture of the extent, manner and consequences of Cannabis use in India.

The material in the work under review here was published more recently in an abbreviated, and in some respects up-dated form in the Bulletin of Narcotics of the United Nations (9:4-29, 1957). This paper brought up to date the sections dealing with the production and the national and international control of Cannabis. In addition, it included the results of a study of Cannabis and mental illness originally published by the authors in the Indian Journal of Medical Research (30:155-171, 1942). The same material, in an even more abbreviated form, can also be found in Chapter Nine of Drug Addiction with Special Reference to India published in 1965 by R. N. and I. C. Chopra.

It should be emphasized that the word "addiction", as used in the title and throughout the text, signifies only habitual use rather than the narrower meaning more commonly given the term in contemporary literature.

The study is divided into four main parts:

Part I - General Considerations (pp. 1-28). This section deals with: early references to Cannabis in historical, medical and literary works of Hindu, Arabian, Persian and European origin; growth of Cannabis in India, both wild and cultivated, past and present; the techniques of preparation of the main Cannabis products used in the Country, i. e. bhang, ganja and charas; licit and illicit traffic in charas between China and India; the nature of the active principle of Cannabis; modes of consumption, including descriptions of the most commonly used folk preparations such as "majun", "halwa" and "curry"; and the religious, social and medicinal uses and abuses.

Following are the results and main conclusions of this part of the work. Cannabis grows wild in northern India and on the southern slopes of the Himalayas. The cultivation of the plant is under government control and restricted to certain areas of the country. The preparations in use are bhang, made mostly from wild plants, ganja made from cultivated plants, and charas which is obtained principally from Chinese Turkestan since its preparation in India is forbidden. Bhang is usually taken orally in the form of a beverage, while ganja and charas are more commonly smoked. The physiological effects of all three substances are similar but of different intensities, bhang being the mildest and charas the strongest. The





drug is used in connexion with religious and social practices, in the Hindu and Moslem native systems of medicine, and for its euphoric and narcotic effects. Use for the latter purposes was quite common in all strata of society around the turn of the century but it has declined gradually, and is currently confined mostly to the lower classes. The upper and middle classes view the habit with contempt and have replaced it with the use of alcohol. This change in attitude is attributed to association of the practice with the lower classes from which most of the undesirable and criminal elements come, and to some of the behavioral effects of the drug which are considered socially objectionable. Severe intoxication is rarely seen except among some religious mendicants who may provoke it deliberately for mystical purposes or to impress their followers with their supernatural powers.

Part II - Present Extent of Hemp-Drug Addiction (pp. 29-50). The authors made a country-wide survey of the incidence of Cannabis consumption during which they "..... visited almost all important districts and towns in India". The data presented are estimates based on excise returns and generally on government statistics. Total consumption and consumption per 1000 of the population were calculated for the country as a whole and for each province during the periods 1909-10, 1919-20, 1929-30 and 1934-35. Furthermore, the consumption of each of the three main Cannabis preparations (bhang, ganja and charas) was calculated in each instance. These data are presented in 7 graphs and one table. The authors note that the figures given are only estimates "..... probably on the low rather than on the high side" since they do not include a certain amount of Cannabis obtained from spontaneous growth and some of the charas smuggled into India from the North. The total number of users was estimated by dividing the total amount of drug consumed in a year by the average annual consumption per user as indicated in their case histories.

Total consumption during 1934-35 amounted to 1,031,496 lbs. or approximately 4.24 lbs. per 1000 of population per year, i. e. about a fourth of what it had been 20 years earlier (15 lbs. per 1000 in 1912-13). The decline in consumption was tentatively attributed to "..... the tightening of control by the government by reduction of the area under cultivation and the increase in price due to enhancement of excise duty". Consumption was not evenly distributed throughout the country. It ranged from 1.6 lbs. per 1000 of population in the Central Provinces and Berar, to 35 lbs. in Sindh. Regional differences were also found with respect to the type of drug used. In the northern and western parts of India charas was the preparation of choice. In Sindh, Rajputana, the western parts of the Punjab and in the United Provinces, the use of bhang as a refreshing drink, particularly during the summer, was more common. The use of ganja was more prevalent in the rest of the country. Consumption was higher in the urban than in the rural areas and more commonly seen in industrial and religious centers. A rough estimate indicated that there were about 1,000,000 Cannabis users in the country or approximately 0.5 to 1.0 per cent of the population.

Figures covering the period up to 1960 are reported in the two more recent publications cited above. Since they are given as total consumption for India, assessment of their significance requires careful study. Thus there have been several changes in the situation which are not clearly stated by the authors, e. g. increase in the population, partition into two countries in 1948, and the stoppage in charas traffic between India and China in the 1930's. The overall impression is, however, that the rate of decline in consumption between 1934 and 1960 was not as great as in the previous 20-year period, and that illicit use of Cannabis has been substantial.

Part III - Analytical Studies (pp. 51-104). In this section the authors report the results of an 8-year study of 1238 Cannabis users. The sample was obtained by first surveying different parts of India and then selecting all the users from certain localities. In the authors' words: "Although our survey extended to all parts of India it is not possible to say how far we have succeeded in taking a representative sample of the addict population of the country as a whole". The data obtained from each user were recorded on a card, the format of which is shown in the text. A detailed personal and family history was obtained, particularly with respect to the use of Cannabis, and a general physical examination was performed. The description of the results, including 32 tables, takes 46 pages of the text. Although on page 51 the authors state that "In drawing our conclusions we have compared the addicts with non-addicts of the same locality", the data for non-users are not presented, except in rare instances.

Of the 1238 subjects, only 6 of whom were women, 772 were primarily consumers of bhang, and 466 used either ganja or charas. Fifty-eight per cent of the series were Hindus, 32 per cent were Moslems and the balance were Sikhs and Christians. In general, the oral use of bhang and ganja was more prevalent among the Hindus while charas smoking was more common among the Moslems. In 37 per cent of the series there was a history of Cannabis use in one or more members of the family, particularly among the parents. In 48 per cent there was a history of diseases of the nervous system consisting mainly of emotional disorders such as neuroticism, disturbances of sleep, hypochondriasis and irritability. This was higher (60%) in the ganja and charas users than in the bhang users. It is noted that some of these disorders, such as insomnia in 17 per cent of the series were given as important motives for the adoption of the habit, and that others, such as irritability and hypochondriasis, were improved after the use of the drug was started. In the majority of the subjects (70%) the habit started between the ages of 21 and 40, and the majority of the group (72%) were still in this age range at the time of the investigation. Twenty-nine per cent were religious mendicants and beggars, 24 per cent were laborers and artisans, 15 per cent hackney carriage drivers and 9 per cent belonged to the priestly classes. These four groups accounted for 77 per cent of the total series. The proportion of unmarried people among the Cannabis users (45%), particularly ganja and charas smokers, appeared to be higher than among the general population.





Association with Cannabis users, particularly in centers of religious pilgrimage or in the family, was the most important single reason for initiation of the habit (24%) and this was more marked in the ganja and charas users than in those who used bhang. Other reasons, in order of importance, were religious and emotional factors (19%), seeking of euphoria (16%), replacement of other drug habits such as use of alcohol, opium and cocaine (12%), and self-medication (8%). The authors note that ready availability of the drug and its low cost were important contributory factors. The category of those seeking euphoria and pleasure included a large number of individuals who stated that they were irritable, aggressive or depressed but who became more self-confident, cheerful and gentle after they took to the drug habitually. It was a common belief among the users that Cannabis has prophylactic and therapeutic properties. For example, 23 per cent thought that it was an analgesic and 19 per cent that it sharpened the appetite and helped digestion. Of the 150 subjects who resorted to the use of Cannabis in order to give up the use of alcohol or opium, 50 succeeded, but the remainder simply became habitual Cannabis users as well.

Unlike opium and cocaine eaters, Cannabis users preferred to enjoy the drug in company, usually in the afternoon or evening. Bhang was often drunk from a common bowl in temples and shrines and the "chillum", or pipe in which ganja and charas are smoked, was shared by a group of individuals gathered together. Although there are no legal restrictions against these parties, they are "..... looked upon with disfavor".

Ninety-eight per cent of the subjects who used bhang took it as a beverage, while ganja and charas were smoked by 92 per cent of those who used them. Consumption by mouth produces a mild euphoria that lasts for several hours, while the effects of smoking are of rapid onset, greater intensity and shorter duration. The majority of bhang users in this series (81%) took daily doses of 45 grains or less, while the majority of ganja and charas users (61%) took more than 45 grains. The duration of the habit was between 1 and 25 years in 88 per cent of the bhang users and in 92 per cent of the ganja and charas users. In none of the latter group had the habit lasted more than 35 years, while there were 12 bhang users who had taken the drug for 36 to 40 years and two for 41 to 50 years. The authors attribute this difference to the fact that ganja and charas "..... are more injurious than bhang".

The findings of the physical examination, referred to as "effects", are presented under four major headings: general health, different organs and systems, generative organs and fecundity.

The subjects' own appraisal of the effects of the use of Cannabis on their general health is interesting. The majority of bhang users (76%) felt either that there was no particular effect (65%), or that there was a slight improvement (11%). Among the ganja and charas users, on the other hand, 65 per cent felt that there was a minor (33%) or marked (32%) impairment of their health. Furthermore, there was a positive correlation between the admission of adverse effects and the size of the daily dose. Thus, none of the subjects who took 10 grains or less daily noted any ill effects, and 30 per cent of them felt that there was an improvement in their health. On the other hand, the majority of those who took between 46 and 360 grains admitted to minor or marked impairment of health. The clinical appraisal confirmed the subjective impressions of the subjects.

Some of the major physical symptoms encountered in Cannabis users were as follows:

<u>Symptom</u>	<u>Percentage of Users</u>
Congestion of conjunctivae	72
Sore throat, pharyngitis, laryngitis	39
Respiratory diseases	39
- chronic bronchitis	22 (6% of bhang users (48% of ganja & charas users)
- emphysema	4.5 (2.3% of bhang users (8.2% of ganja & charas users)
Gastrointestinal complaints (diarrhoea, alternating diarrhoea & constipation, loss of appetite, dyspepsia)	30
Loss of weight	20

Prolonged congestion of the conjunctivae leads to a yellow discoloration which the authors considered "..... a very important sign by which addiction to hemp drugs, particularly ganja and charas smoking, can be diagnosed". The high frequency of upper and lower respiratory tract disease was associated chiefly with the smoking of ganja and charas. The authors call attention to the fact that prolonged smoking of any



substance can produce these illnesses, and point out that ganja and charas are always smoked in a mixture with tobacco, and deeply inhaled so as to produce the desired effects. They conclude that "It is not fair therefore to put on these drugs [ganja and charas] the entire responsibility of producing these [respiratory] conditions".

The effects of Cannabis on sexual performance, assessed from the statements of the users, are indicated below:

	Bhang Users	Ganja & Charas Users	Total
Sexual depression	52%	19%	40%
Sexual stimulation	2%	41%	16%
Initial stimulation, later depression	19%	21%	20%
No effect	27%	19%	24%

Again, it is obvious that the stated effects differed in frequency among the users of different preparations, bhang being much less stimulant than ganja and charas. But with the latter preparations, stimulation was much more clearly felt with small or moderate doses than with large ones. These findings were in keeping with the popular beliefs prevalent in India, where some thought of the drug as an aphrodisiac, while others, particularly "saintly people" used Cannabis to suppress their sexual desires. The authors feel that the effects, both stimulating and depressing are purely psychic phenomena.

The question of fertility was studied in the 686 subjects who were married or widowers and who were using Cannabis at the time of their marriage or who started to use it soon afterwards. The number of children per 100 families was compared to that found in opium users and in the general population. The figures were 344, 273 and 396, respectively. Sterility was found in 2 per cent of the marriages or almost double that in the general population, but much lower than the 17 per cent found among the families of opium addicts. It is concluded that the fertility rate is lower than normal among Cannabis users, but strikingly higher than in opium addicts. But here again there was a marked difference between the bhang and the ganja and charas users. For example, 0.4 per cent of the marriages of bhang users were sterile as opposed to 5.7 per cent in the case of ganja and charas users, and the incidence of families with 5 or more children was higher in the former than in the latter group. This was attributed to the fact that ganja and charas "..... are mostly taken by sadhus, fakirs, and low-class people with loose morals and high incidence of venereal disease".

The effects of Cannabis on the central nervous system are described under two main headings: temporary effects, i. e. those that occur while the subject is under the influence of the drug, and permanent effects, i. e. those observed after prolonged use.

The description of the transient effects was based on the results of the oral administration of various doses of Cannabis to 10 non-habituated volunteers, including the junior author, on the accounts given by the chronic users in their sample, and on 12 cases of acute poisoning.

Small and moderate doses in non-users produced an increase in the pulse rate, slight dilatation of the pupils, flushing of the face, a feeling of warmth and of partial anesthesia all over the body, and an increase in appetite and in the tendency to talk. Except for two cases who showed a distortion of the sense of time and space, all subjects conducted themselves rationally. Aphrodisiac sensations were experienced rarely. With larger doses the above symptoms were more intense, and were followed by drowsiness and deep sleep. In the cases of poisoning there was also congestion of the conjunctivae, increase in the respiratory rate, and excitement and confusion during the early stages. This was followed later by weak and rapid pulse, slow and occasionally shallow respiration, and eventually a state of drowsiness and stupor during which the skin was cold and dry, the temperature sub-normal, and pulse slow and the flow of urine increased. Conventional treatment led to recovery within 24 to 72 hours.

The bhang drinkers reported that moderate doses produced a general feeling of well-being, relief from worries, sharpened appetite, and sound sleep. In some there was an increased interest in their activities and surroundings. The religious mendicants felt that the drug allowed them to concentrate more deeply in their meditations. Objectively there was exaggerated emotionality and impairment of judgment. The effects might appear within half an hour and last for two to twelve hours. Except for slight heaviness in the head and redness of the eyes no untoward effects were experienced on awakening the following day.

Smoking of moderate doses of ganja or charas produced first a feeling of anxiety and restlessness, followed by a sense of well-being, congeniality and talkativeness, while all sorts of grotesque ideas passed through the mind. This could express itself in the form of gay, childish or silly behavior. Fits of laughter might alternate with crying, and there was a distortion of the sense of time and space. Sensory hyperacuity and hallucinations of all modalities were frequently experienced. The subjective reaction could be intensely pleasurable or intensely disturbing. Deep sleep followed in most cases. Some individuals reacted atypically. They might for example, lose all sense of proportion and become irresponsible. Others might remain in a static position with their lower lip hanging down, or pass into a state of ecstasy, jumping and dancing until they fainted from exhaustion. Still others, particularly after large doses, passed directly into a stage of depression and sleep. Heaviness in the head, lethargy and disagreeable mental sensations were frequent the





next day. Even moderate habitual use of ganja and charas produces a longing for the drug, and, in some instances distinct restlessness if it cannot be procured, but never the craving seen in opium and cocaine users.

The majority of the subjects (59%) experienced a sense of well-being and euphoria after taking the drug, but this was more frequent among the ganja and charas smokers than among the bhang drinkers. On the other hand, in about a quarter of the group the predominant reaction was one of depression, and the subjects felt giddy and wanted to retire to a quiet place. In a smaller proportion there was neither stimulation nor depression. These were individuals who had taken large doses for a prolonged time and who "... were unable to give up the habit as they dreaded the withdrawal symptoms".

The mental examination disclosed that 28 individuals suffered from serious disorders including: 2 cases of epilepsy, 13 of insanity and 13 of psychopathy, both of the latter being more prevalent among the ganja and charas users than among the bhang users. Minor emotional disorders, including emotional lability, impairment of judgment and memory, sloppy habits, irritability, insomnia and hypochondriasis, were diagnosed in 639 subjects. The authors consider that these conditions cannot be entirely attributed to the use of Cannabis because a significant proportion of the group had pre-existing neurotic tendencies, but the drug habit made their condition worse. The remaining 571 subjects (46%) were considered to be normal. The authors conclude that "The statement that the use of hemp drugs is always attended with a certain amount of injury to the central nervous system was not borne out by our observations". It should be remembered that here, as in relation to the frequency of physical illnesses among the users, no morbidity data for comparable groups of non-users are presented for comparison.

The study of the sleep habits of these individuals showed a normal or better than normal pattern in 82 per cent of the group, and disturbed sleep or frank insomnia in the remaining 18 per cent, composed mostly of ganja and charas users. The authors attribute this "..... to the fact that bhang as a sedative has a mild and prolonged action, while ganja and charas have rapid and intense effects in which euphoria and stimulation are more pronounced". But they also note that the history of the subjects who suffered from definite insomnia shows that most of them "..... were highly strung neurotic individuals who had taken to the drug habit unsuccessfully for the relief of distressing insomnia from which they were suffering".

The assessment of the criminal behavior of the subjects was based on their own statements as to the number of times they had been convicted. Nine per cent of the bhang users and 28 per cent of the ganja and charas users had been convicted once or more. These figures were higher than those for the general population. The authors point out, however, that "Such instances do not necessarily prove any definite relationship between hemp drug and crime" because the proportion of habitual criminals in the classes where Cannabis use is prevalent was higher than in the general population and because some of the convictions involved petty thefts committed in order to finance the drug habit. According to the authors Cannabis has a tendency to bring to the fore or exaggerate the main traits of the personality. Therefore, it may incite irritable and excitable individuals to commit crimes of a violent nature under certain circumstances, while in others it may act as a deterrent against the commission of crime. They considered that prolonged and excessive use resulted in timidity rather than in aggressive behavior. An examination of the murder and crime records of jails and mental hospitals showed that only one to two per cent of the total number of crimes were directly related to the temporary or permanent disturbances produced by the consumption of Cannabis.

The judgment of the subjects themselves with respect to the overall beneficial or harmful consequences of their drug habit was interesting. In the series as a whole half of them felt that it was harmful, 27 per cent that it was beneficial and 12 per cent that it was neither. The majority of bhang users, or of those who took small doses of all three preparations, felt that the consequences were nil or beneficial, while the majority of ganja and charas users, or of those who took large doses, thought the habit was harmful. These subjective judgments are consistent with the detailed findings of the investigation. The authors conclude that moderate use was not harmful, while excessive use was. Moreover, the harm is mainly confined to the individual himself, the effects on the society as a whole being "..... very small in comparison to the opium and cocaine habits".

Assuming that the sample so thoroughly studied by the Chopras was representative of the various types of Cannabis users in India, and that the information provided by the subjects was essentially truthful, some of their results are not subject to question. On the whole, this applies to their findings with respect to types of preparations used, doses, the circumstances under which the drug is used, purpose, attitude of the users to the drug, their socio-economic characteristics and the nature of the acute effects. In these respects, the survey is remarkably good and very valuable. On the other hand, the question as to whether or not chronic use of Cannabis drugs results in physical, mental and/or social ill-effects is not as easy to evaluate from the evidence presented. The main reason for this is the lack of equivalent data from a comparable control sample of non-users. Thus, a causal relationship is generally implied or suggested, but not necessarily proven, between the use of Cannabis and the occurrence of abnormal symptoms and behavior.





In the absence of control data, it must be said that only a correlation of undetermined significance was established between these two phenomena. However, the nature of the sample was such that it permits comparisons of the moderate and the heavy users, and these were generally made by the authors. Unfortunately, the amount of drug used was not the only difference between the moderate and the heavy users, since the majority of the latter smoked the drug in combination with significant amounts of tobacco, while the former took it orally. Therefore, there were at least three variables involved: dose, route of administration of the active principles, and inhalation of smoke from both Cannabis and tobacco. In the light of current knowledge the possible influence of the latter factor, particularly on the respiratory system, cannot be totally ignored. In addition, the psychological and social characteristics of the two groups of users were different.

It should be understood that these sources of error are likely to affect the results in such a way as to make the habitual use of Cannabis appear to be more responsible than it may really have been for the abnormalities found in the sample. Thus, no specific data for physical and mental morbidity or for frequency of crime in equivalent control groups are presented. This means that the findings give the worst possible picture of the consequences with respect to the criteria used, rather than an accurate picture of the effects exclusively due to the drugs.

Despite the foregoing reservations it can be concluded that, in general, the moderate users of bhang were reasonably healthy, well-adjusted individuals whose use of the drug resulted in a pleasant and mild degree of intoxication which did not interfere with their routine activities. On the other hand, the smoking of ganja and charas, particularly in excess, was unquestionably correlated with a higher incidence of ill effects, the most conspicuous of which were diseases of the respiratory and digestive systems, a lower than normal number of offspring in their families, and emotional and social maladjustment. In addition, the degree of intoxication sought and achieved by ganja and charas users was much more intense than in the case of bhang users. It was not conclusively demonstrated that all characteristics of the former group were attributable to the specific pharmacological action of Cannabis. Thus, the respiratory illnesses might have been caused by other components of the smoke, or by the smoke of tobacco origin, and the emotional and social maladjustment might have been, at least in part, the cause rather than the result of habitual intoxication.

The study as a whole suggests interesting leads for contemporary research in this enormously complex field.

Part IV - Studies on the Pharmacological Action of Hemp Drugs and Their Role in Habit Formation (pp. 105-119). A series of experiments of an exploratory nature in animals and man are described in this section. Since they were essentially qualitative and the experimental conditions were either inadequate or not properly presented, particularly with respect to numbers of animals and control data, they are of very limited value. Some of the more interesting observations were as follows:

The oral administration of various crude preparations of Cannabis to cats and dogs produced motor effects that could be divided into three stages: a state of stimulation and excitement followed by a period of depression and anesthesia, and a tertiary stage of stimulation which was only observed with large doses or in particularly sensitive animals. The further observation was made that while under the effects of the drug, cats and dogs placed together did not show their usual aggressive attitude towards each other.

The possible development of addiction was studied in 2 monkeys who were forced to inhale ganja smoke for 90 days, in 3 cats who were given ganja and charas orally for 12 to 16 weeks and in an unspecified number of rats to whom an alcoholic extract of Cannabis was administered intraperitoneally for 4 weeks. The experiments in the monkeys and cats were inconclusive, except for some signs of development of tolerance. The monkeys developed dysentery, attributed to confinement in cages, and died after 6 months. The cats died in a state of chronic toxemia after 16 weeks. The rats showed no marked signs of intoxication, but as the experiment proceeded their degree of irritability increased during withdrawal. This was tested weekly in terms of a struggle response 24 hours after the last previous administration of the extract. This phenomenon lasted for some weeks after the administration of the Cannabis extract was stopped and was not observed in control rats given distilled water. However, they did not include a control group given an alcohol solution of the same concentration as that used for the Cannabis extract. The authors conclude that some degree of tolerance and of an abstinence syndrome occurred, particularly in the rats, after repeated administration of Cannabis, but that these signs of addiction were much less marked than in the case of opium or morphine.

The minimum lethal doses of bhang, ganja and charas administered orally to cats were 10, 8 and 3 g/kg of body weight, respectively, i. e. charas was more than twice as toxic as ganja and three times as toxic as bhang.

The oral administration of Cannabis to 10 volunteer non-users showed marked variability in effect. This is illustrated by two detailed protocols.

The smoking of 0.5 to 2 g of ganja or charas by 100 regular users produced euphoria in 74 and depression in 12. Other important effects were talkativeness in 60, increased appetite in 58, less fatigue due to work in 60 and constriction of the throat in 40.



Adams, R. Marihuana. Harvey Lectures Series 37:168-97, 1941/42.

This is a report of the results of the cooperative investigations on marihuana of three groups of researchers and covers three major fields: chemistry, pharmacology and medical aspects. The section on pharmacology reviews the subject and reports the findings of S. Loewe which were more fully and independently reviewed by that author in: Mayor's Committee on Marihuana. The Marihuana Problem in the City of New York, pp. 149-212, 1944. The section on the medical aspects (pp. 185-195) is a summary of the studies directed by Allentuck and also reported independently (Amer. J. Psychiat. 99: 248 et seq., 1942 and Mayor's Report, op. cit., pp. 35-64). But this section also includes a description by Adams of the acute effects of tetrahydrocannabinol in doses of 15-30 mg on four chemists (pp. 189-93). The section on chemistry (pp. 170-80) consists primarily of a review of the work of Adams et al. at the University of Illinois on: 1) The isolation and determination of the structure of cannabidiol; 2) The synthesis and elucidation of the structure of cannabinol; and 3) The preparation of tetrahydrocannabinol and synthetic analogues. This work has also been reviewed by Adams in: Science 92:115, 1940. The bibliography of 65 references covers the chemical and pharmacological studies.

Mayor's Committee on Marihuana. The Marihuana Problem in the City of New York. Sociological, Medical, Psychological and Pharmacological Studies.  
Lancaster, Penn.: Jaques Cattell Press 1944, 220 pp.

Towards the end of 1938 Mayor La Guardia of New York requested the help of the New York Academy of Medicine on the question of the effects of marihuana on man and of the extent of its use. After reviewing the literature and attempting to establish the extent of marihuana use, a subcommittee of the Academy, especially appointed for the purpose, failed to reach any clear conclusions and therefore recommended that an ad hoc investigation be made on the sociological and clinical aspects of marihuana use. At the beginning of 1939 Mayor La Guardia appointed a special committee, generally known as the Mayor's Committee on Marihuana, who spent a year planning the research.

The study was composed of two parts: 1) A sociological investigation carried out by six especially trained police officers under the direction of D. D. Shoenfeld. Its purpose was to establish "..... the extent of marihuana smoking and the methods by which the drug is obtained; in what districts and among what races, classes, or types of persons the use is most prevalent; whether certain social conditions are factors in its use, and what relation there is between its use and criminal or antisocial acts". 2) A Clinical study. The medical and psychiatric aspects were investigated under the general supervision of K. K. Bowman. D. Wechsler was in charge of the psychological investigations. The clinical study was undertaken to determine "..... the physiological and psychological effects of marihuana on different types of persons; the question as to whether it causes physical or mental deterioration; and its possible therapeutic effects in the treatment of disease or of other drug addictions". The final report also includes a pharmacological study by S. Loewe of the Cornell Medical School which in fact comprises about a third of the report.

This document is unique and of particular interest in the field of the literature on Cannabis not so much because of its scope or contents, as because of the extreme reactions that its publication produced. Generally, those who are strongly opposed to the popular use of marihuana, particularly people involved in law enforcement, have accused it of being unscientific and socially harmful; those who are equally strongly in favor of freedom of use of the drug, have accepted it as their gospel. Both reactions stem from the nature of the major conclusions drawn from the study, which tended to contradict the sensational and lurid claims in the popular press of the U. S. A. at that time. Thus the Committee found: that the use of marihuana by New York school children was not widespread; that the drug per se did not produce aggressive or criminal behavior, or sexual excesses; that there was no evidence of physical or mental deterioration in chronic users; and that there was no evidence of addiction, since the habit could easily be given up without the production of withdrawal symptoms. Seen in the social and legal context prevailing at the time (the Marihuana Tax Act had been passed in 1937), these conclusions seemed to negate the very basis of the campaign against marihuana and could be considered as either courageous or reckless depending on the point of view adopted.

Judged from a purely scientific standpoint this study deserves neither the extravagant praise nor the vicious attacks to which it has been submitted. The sociological study (pp. 1-25) is a thorough and imaginative attempt to distinguish fact from rumor with respect to the pattern of marihuana use in New York. The clinical study (pp. 26-147) is a very comprehensive investigation, carried out on a reasonably large number of subjects (77), of the physical and mental effects of the drug on both users and non-users. The pharmacological study (pp. 149-212) covers every aspect of the pharmacological effects of marihuana and of their relationship to the various chemical constituents of the crude drug.





Thus the investigation was undoubtedly comprehensive and, generally speaking, the conclusions drawn seem warranted by the data presented. On the other hand, some major criticisms are indicated: 1) Regretably, the findings of the sociological and clinical studies are not discussed in the context of previous knowledge about the effects of the drug. 2) The clinical and psychological investigations were not done under double blind conditions, nor were placebos administered. 3) Although mention is made of statistical analyses of the results, and of significant or non-significant differences, the relevant evidence is not presented. 4) In some instances, e. g. the paper by Halpern on Intellectual Functioning, there is an obvious bias in the wording, in the sense that when the effects of marihuana were of the untoward variety they are clearly stated as such, while positive effects of apparently equal magnitude are generally ignored or referred to in a negative way. 5) The conclusions that marihuana smoking does not lead to physical or mental deterioration or to physical addiction were based primarily on an examination of 48 subjects. Ten of these were occasional users, 29 had used the drug for less than 10 years and only 9 had used it for 10 years or more. The number of subjects seems too small to permit valid conclusions in these respects. This is comparable to concluding that alcohol does not produce addiction from an examination of 48 beer drinkers. 6) Some of the conclusions drawn on the acute effects should be qualified because of the type of subjects used (prison inmates) and because of the setting in which the drug was consumed (a hospital ward).

It seems fair to conclude, therefore, that the Mayor's Report, like many such investigations, is a valuable contribution to knowledge of Cannabis, but that its limitations in scope and design detract from its general applicability. A brief summary of each section of the report is provided below.

Shoenfeld, D. D. Sociological Study (pp. 1-25). The purpose of this study was to establish the extent of the use of marihuana, its method of distribution, the attitude of the user towards society and towards the drug, and the relationship between the use of marihuana and eroticism, crime and juvenile delinquency. It was confined to the borough of Manhattan and was performed by six specifically selected and trained police officers, four men and two women. These investigators conducted a field study during which they lived in the environment in which the use of marihuana was suspected. From their observations the following conclusions were drawn: The use of marihuana in Manhattan, particularly in Harlem, was extensive but of recent origin. The majority of users were Negro and Puerto Rican. There was no evidence of widespread use among school children. Marihuana cigarettes were cheap and therefore within reach of most persons, but their distribution and sale were not under the control of any single organization. The consensus among users was that the drug produces a feeling of adequacy. No evidence was found to support the contention that marihuana produces addiction, that it leads to the use of opiates and cocaine, or that it plays a role in the commission of major crimes or in juvenile delinquency. It is finally concluded that: "The publicity concerning the catastrophic effects of marihuana smoking in New York City is unfounded".

Various Authors. Clinical Study (pp. 26-148). This section of the report is organized under six headings:

1. Plan and Scope of the Clinical Study (pp. 26-34)
2. Medical Aspects (pp. 35-64)
3. Psychological Aspects (pp. 65-139)
4. Comparison Between Users and Non-Users from the Standpoint of Mental and Physical Deterioration (pp. 140-143)
5. Addiction and Tolerance (pp. 144-146)
6. Possible Therapeutic Application (pp. 147-148)

Plan and Scope (pp. 26-34). The studies were conducted in an 8-bed ward of Goldwater Memorial Hospital on Welfare Island. The subjects consisted of 5 volunteers drawn from the general population and of 72 volunteers drawn from Riker's and Hart Island penitentiaries and from the House of Detention for Women. They were brought to the hospital in groups of 6 to 10 and stayed there 4 to 6 weeks under the surveillance of police guards. Of the main group of 72 inmates 65 were men and 7 were women (6 opium addicts), and 35 were white, 26 Negroes and 11 Puerto Ricans. Forty-eight of the subjects had had previous experience with marihuana. The group as a whole was physically healthy and of average intelligence. A physical, neurological and psychiatric examination was given each subject on admission. The marihuana used was in the form of a concentrate (administered in pill form) provided by the Treasury Department, and cigarettes provided by the New York City Police.

Allentuck, S. Medical Aspects (pp. 35-64). Symptoms and Behavior (pp. 35-51). The physical and behavioral effects of the marihuana concentrate in oral doses ranging from 2 to 22 cc were observed in all subjects, while the effects of smoking marihuana cigarettes (1 to 10 per hour) were studied in 32 subjects. After oral administration the effects became evident in from one half to one hour, reached their peak in from two to three hours and generally lasted from three to five hours. The effects of smoking appeared sooner and lasted from 1 to 4 hours. A feeling of euphoria, interrupted from time to time by disagreeable sensations, was observed in most subjects, users and non-users alike. If the subjects were left undisturbed there was a state of quiet drowsiness, while restlessness, talkativeness, laughter and joking were commonly seen in groups. Excitement, antagonism, anxiety and eroticism were seen in some of the subjects, but no overt aggression. Lightness in the head or dizziness, dryness of the throat, heaviness in the extremities, unsteadiness, hunger, thirst and a high floating sensation were common physical symptoms. Tremor and ataxia, dilatation of the pupils and sluggish response to light were seen in all subjects.





With the exception of euphoria the effects, generally, were more pronounced on the non-users and were roughly, but not consistently, proportional to the dose. Since smoking permitted a finer gradation of the dose the disagreeable sensations were less frequent than with the concentrate. Transient toxic psychotic episodes were observed in 6 subjects with doses of 4 to 8 cc of the concentrate. They were characterized by mixed euphoria and anxiety, laughter, elation, excitement, disorientation and confusion. True psychotic states were observed in 3 subjects shortly after the ingestion of marihuana. One was an epileptic, the other had a pre-psychotic personality and the third was considered to be a case of prison psychosis. The author concludes: "..... that given the potential personality make-up and the right time and environment, marihuana may bring on a true psychotic state".

Organic and Systemic Functions (pp. 51-64). Conventional clinical laboratory tests of circulatory, digestive, respiratory, central nervous system, and liver and kidney functions, as well as blood sugar and metabolic rate determinations, were performed in various numbers of subjects both under normal conditions and after the ingestion of several doses of the marihuana concentrate. The major findings were: The most consistent effect was an increase in the pulse rate which reached a peak in about 2 hours and then gradually disappeared. This was usually but not consistently accompanied by an increase in blood pressure. There was generally an increase in blood sugar level and in basal metabolic rate which did not exceed the high normal limits. Increased frequency of urination was observed often but this was not accompanied by an increase in urine volume. The majority of subjects experienced hunger and an increase in appetite, particularly for sweets. Nausea and vomiting occurred in some subjects. Other functions were not affected. These effects were not proportional to the dose. It is concluded that the effects observed were due to the action of the drug on the central nervous system.

This work is more in the nature of an exploratory pilot study than a well designed and definitive investigation. It may be that the main conclusions are valid, but the data as presented are not convincing because of a failure to use double blind conditions, lack of appropriate controls and the absence of statistical analyses of the results.

Psychological Aspects (pp. 65-139). Morrow, R. S. Psychological and Other Functions (pp. 65-81). The following psychomotor and psychological functions were studied in 54 subjects (36 marihuana users and 18 non-users): static equilibrium, hand steadiness, tapping speed, grip strength, simple and complex reaction time, musical aptitude, auditory acuity, and perception of time and length. The tests were administered at weekly intervals without drug, and while the subjects were under the influence of 2 and 5 cc of the marihuana concentrate. The psychomotor tests were repeated at hourly intervals for 8 hours after the administration of the drug, and the others before taking marihuana and once more 3 to 4 hours later. Some of these functions were also measured in 11 users and 9 non-users before and after smoking from 3 to 5 marihuana cigarettes, and in 5 women.

The following results were reported: The simpler psychomotor functions such as speed of tapping and simple reaction time were affected slightly by the large doses and negligibly or not at all by the small doses. The more complex functions such as static equilibrium, hand steadiness and complex reaction time were substantially and adversely affected by both doses. The effects of the large doses were consistently but not proportionately greater than those of the small doses. Generally the effects became manifest from 1 to 2 hours after ingestion, reached their peak at the 4th hour and had practically disappeared after 8 hours. The effects of the cigarettes on men and of the oral preparation in women were similar to those already described, but appeared and tapered off sooner. Generally the effects were more pronounced in the non-users than in the users. No effects were observed on musical ability, auditory acuity or on the ability to estimate short periods of time or linear distance.

In this study the dispersion of the results and the critical ratios were determined but are not presented. It can be inferred from this that the effects of the drug as stated were statistically significant. The use of placebos was unsuccessfully attempted. It is interesting to note that although the objective estimation of time was not affected by marihuana, many subjects reported the well-known subjective sensation of time passing very slowly.

Halpern, G. Intellectual Functioning (pp. 81-106). A battery of tests designed to measure various aspects of intellectual performance were administered to users and non-users under a variety of experimental conditions. The tests administered were intended to provide measurements of general and specific intelligence, learning ability, speed and accuracy of performance, application of acquired knowledge, ability to perform routine tasks, various types of memory, etc. In some instances the tests were given at regular intervals after administration of marihuana, and in others once without drug and once while under its effect. In most cases the effects of 2 and 5 cc of the marihuana concentrate were studied. Some of the tests were also administered while the subjects were under the influence of smoking marihuana cigarettes.

The author concludes that oral or smoked marihuana "has a transitory adverse effect on mental functioning". The extent, time of onset and duration of the impairment are related to the dose; "Small doses



cause only slight falling off in mental ability while larger doses result in greater impairment". The degree of impairment was greater in complex than in more simple functions, and in non-users than in users. The impairment is due to a loss in both speed and accuracy. "Indulgence in marihuana does not appear to result in mental deterioration".

This investigation is subject to the same criticisms that were levelled at the paper by Allentuck on Organic and Systemic Functions, i. e. the significance of the results is highly questionable because of inadequacies in experimental design, and lack of statistical analyses. Furthermore, the main conclusion drawn, that marihuana generally impairs mental functioning, is not consistent with some of the results presented nor with Halpern's own discussion of these in the body of the paper. For example, 2 cc of the concentrate in certain instances apparently produced an improvement in performance. Thus, in the Army Alpha Test, which measures 6 types of intellectual performance, the administration of 2 cc of the concentrate produced practically no effect on common sense, a moderate decrement in arithmetic and numerical ability, but an improvement in verbal ability in the same-opposite and analogies sub-tests and possibly in the mixed sentences. This apparent improvement was of roughly comparable magnitude to the impairment produced by 5 cc on the arithmetic sub-tests. In the discussion the author takes note of these apparent improvements, and recognizes that they might possibly indicate a true stimulant effect of marihuana on verbal functioning. In her conclusion, however, she stated only that: "In general it may be stated that marihuana has a deleterious effect on mental functioning. . . .". Another example occurs in the Digit Symbol Test in which a decrement of 12 points with the 5 cc dose is considered indicative of impairment while an increase of 19 points with 2 cc is considered to be no change from the control.

In summary the results seem to bear out the conclusion that big enough doses of marihuana impair a variety of mental functions, while small doses may improve some of them. These conclusions, however, are only tentative because the author presents no statistical treatment of the data.

Halpern, F. Emotional and General Personality Structure (pp. 107-132). Eleven tests designed to give a quantitative appraisal of various emotional and personality traits were administered to users and non-users in the normal state and while under the influence of small and large doses of marihuana and of marihuana cigarettes. Some of the tests were given to reasonably large numbers of subjects, e. g. 27 users and 18 non-users, while others were carried out with only 9 subjects. The emotional and personality traits studied included emotional reaction and stability, self-image, self-confidence and self-appraisal, suggestibility, vocational interests, drive and ambition, preoccupations and disturbing matters, and degree of social adjustment. A clinical appraisal of the general behavior of the subjects under various conditions was also undertaken.

It is concluded that under the influence of marihuana the basic personality of the individual does not change, although some aspects of his behavior do, i. e. "..... reactions which are natively alien to the individual cannot be induced by the ingestion or smoking of marihuana". The effects observed were not proportional to the dose and some of them were actually in opposite directions as a result of the administration of 2 or of 5 cc of the concentrate. Thus, with 2 cc or while under the influence of marihuana cigarettes subjects showed some reduction in drive, less objectivity, less aggression, more self-confidence and a more favorable attitude towards themselves. These reactions were expressed verbally rather than physically. On the other hand, in the state produced by 5 cc of the concentrate the pleasurable sensations appeared outweighed by anxiety and/or physical distress, leading to a sense of insecurity and to a negativistic attitude. Generally the users differed from the non-users in that they were more introverted and emotionally inhibited, and in that their response to the state of intoxication involved more pleasure and less anxiety.

It is possible that the essentially pleasurable state produced by small doses of marihuana may have a bearing on the results reported in the previous paper which suggest that, at certain levels of intoxication, intellectual performance is not impaired substantially, and in some instances it appears to be improved.

Woltmann, A. G. Family and Community Ideologies (pp. 133-139). The reactions of 18 subjects toward play situations designed to appraise their attitudes toward family set-up, different occupations, income, aggression and authority were studied both in the normal state and while under the influence of marihuana (no dose stated). For this purpose the subjects were provided with a large variety of toy models of people, houses, domestic objects, etc. with which they built a home and a town.

It is concluded that, in general, attitudes towards family and community are not markedly affected by the ingestion of marihuana and that the subjects show the same degree of passivity seen in other parts of the study. The only significant changes observed under the action of marihuana were the subjects' attitude towards the drug itself and their approach to the construction of a community. Under these conditions twice as many subjects showed tolerance toward the sale of marihuana, and the construction of their communities was less well organized. The latter effect was attributed to the general indifference and impairment of motor coordination induced by the drug.





Comparison Between Users and Non-Users from the Standpoint of Mental and Physical Deterioration (pp. 140-143). The physical, neurological and psychiatric examination of the subjects disclosed no abnormalities in the 48 marihuana users. A quantitative investigation of blood components, circulatory, respiratory and kidney functions and basal metabolic rate in 17 subjects who had smoked marihuana cigarettes daily for 2 to 16 years also failed to show abnormal results. The results of the Bellevue Adult Intelligence Test, which was administered to 40 marihuana users and 20 non-users, indicated normal I. Q. for the group as a whole and no significant difference between users and non-users. Furthermore, the evaluation of individual functions provided by the same test failed to show the characteristic irregularity indicative of mental deterioration and usually seen in psychotic states. For these reasons it is concluded that: "There is definite evidence in this study that the marihuana users were not inferior in intelligence to the general population and that they had suffered no mental or physical deterioration as a result of their use of the drug".

Addiction and Tolerance (pp. 144-146). It is concluded that ".... neither true addiction nor tolerance is found in marihuana users" and that the habit depends on the pleasurable effects that the drug produces. This was derived from ".... the absence of any compelling urge to use the drug, the absence of any distressing abstinence symptoms and the statements that no increase in dosage is required to repeat the desired effects in users".

This conclusion was based on the observation of 48 marihuana users, on the results of the sociological study and on interviews by Bromberg of several hundred marihuana users. It, as well as the statement that there is no mental and physical deterioration in marihuana users, are probably valid conclusions for the type of user investigated and for the particular preparation of Cannabis used. However, their applicability to other modes of use and to the consumption of stronger preparations for longer periods of time remains quite uncertain. These are important qualifications to keep in mind because the report is widely quoted as though it were the definitive work on the subject.

Possible Therapeutic Applications (pp. 147-148). Because of the euphoriant and appetite-stimulating action of marihuana and the absence of any substantial evidence that it produces dependence, it is considered that it might be useful in the treatment of the abstinence syndrome in morphine and heroin addicts. A preliminary study carried out on 56 addicts suggested that the administration of tetrahydrocannabinol resulted in less severe symptoms, improved appetite and generally a better clinical condition of the patients during withdrawal. It is pointed out that this question should be investigated under completely controlled conditions before drawing any further conclusions.

Loewe, S. Pharmacological Study (pp. 149-212). This extensive section is both a report of original work by the author and two other groups of investigators on the chemistry and experimental pharmacology of Cannabis, and a critical examination of their findings in relation to previously published work.

When the investigation was begun in 1937, the problems to be faced were formidable indeed. Nearly a century of research into the chemical constitution of the active principles of Cannabis had resulted only in the isolation and partial characterization of one compound, cannabinol, and it was devoid of pharmacological activity. The active material was a resinous oily concentrate of ill-defined composition and of variable pharmacological potency. Furthermore, the unwarranted assumption was often made that the euphoriant action of Cannabis in man corresponded to various actions of the drug in animals, such as ataxia in dogs, corneal anesthesia in rabbits, and lethality in goldfish. These effects formed the basis of biological assays which were presumed to indicate overall activity. In other words, unknown compounds were being tested by ill-understood if not irrelevant methods.

The work reported in this section consists essentially of the systematic testing by the author of the various pharmacological actions of a great number of pure and semi-pure Cannabis compounds provided by two groups of chemists. It constitutes a great step forward in the understanding of the relationship between chemical structure and pharmacological activity.

The section is divided into six major sub-sections:

I. The Relationship Between Structure and Activity and the Significance of Coordinated Pharmacological and Chemical Investigations as Applied to Marihuana (pp. 149-150). The problem and the author's approach to it are described.

II. Source of Drugs with Marihuana Activity (pp. 150-156). A brief description is given of the characteristics of the plant, of the resinous exudate which is pharmacologically active, of the factors that influence the amount of resin and the degree of its activity in plants of different origins, and of the significance of chemical color tests conventionally used to estimate potency.

III. The Pharmacological Actions of Marihuana (pp. 156-162). The effects of marihuana in animals which can be presumed to be due to the chief active principles, and their possible site of action, are described and discussed. The main effects are: gastrointestinal symptoms such as retching, vomiting and diarrhea; circulatory effects such as alterations in the pulse rate; motor symptoms including tremors and ataxia; peripheral





nervous symptoms such as scratching, corneal anesthesia and mydriasis; and central nervous symptoms namely, depressant action and synergistic hypnotic effect.

IV. Approaches to the Discovery of the Active Principles of Marihuana (pp. 162-181). The chemical approach consists of a discussion of the characteristics of natural and synthetic compounds of the cannabinol class. Included are: cannabinol, cannabidiol, tetrahydrocannabinol and tetrahydrocannabinol analogs and homologs.

The pharmacological approach is a thorough discussion of the significance, accuracy and limitations of various biological assay methods for Cannabis such as the goldfish test, the corneal anesthesia test in rabbits and the ataxia test in dogs.

V. The Active Principles of Marihuana - Structure Activity Relation in the Cannabinol Class (pp. 181-203). This is the principal sub-section and comprises a description and discussion of the results of the pharmacological testing of 41 extracts of Cannabis of various origins and degrees of purity, and of 64 chemical compounds of the Cannabinol class, both natural and synthetic. Although the main effect studied was ataxia in dogs, other pharmacological actions were tested for some of the substances.

VI. Some Other Pharmacological Aspects of Marihuana (pp. 203-208). The questions of stability, mode of administration and duration of effect, tolerance, habituation and addiction, and the possible mechanism of action of marihuana are discussed.

Summary (pp. 209-210). The main conclusions of the pharmacological section are as follows:

Cannabis seeds contain detectable amounts of active principles. The varieties of Cannabis show a difference in content of active principles, and this persists over generations, independently of soil and climate.

The only actions of Cannabis that lend themselves to quantitative methods of assay are the ataxia produced in dogs and the synergistic hypnotic effect in mice.

The natural tetrahydrocannabinols produce ataxia in dogs, psychic action in man, and a decrease in the respiratory rate and an increase in the pulse rate in the non-narcotized dog. They are intermediate products between the labile cannabidiol and the stable cannabinol which constitute the bulk of the Cannabis oil. Ultraviolet irradiation of cannabidiol in vitro leads to the formation of tetrahydrocannabinol.

Although numerous isomers, homologs and analogs of tetra- and hexahydrocannabinol are specifically active their potency varies markedly. The most active are the natural, optically active tetrahydrocannabinols. The hexyl homolog of synthetic tetrahydrocannabinol is more active than the amyl compound.

The synergistic hypnotic action in the mouse is due to cannabidiol. Impure distillate oils have a stronger corneal areflexia action than the tetrahydrocannabinols. This suggests that the effect may be due to an unknown compound or to poor reproducibility. 7-Methyltetrahydrocannabinol and tetrahydrocannabidiol have a convulsant action in dogs. Amphetamine increases the ataxia effect considerably, but amytal has no effect.

Wallace, G. B. Summary (pp. 213-220). The major conclusions from each section of the study are repeated.

Todd, A. R. Hashish. *Experientia* 2:55-60, 1946.

This is the last of a series of critical reviews by the author on the major landmarks of the chemistry of Cannabis. The others appeared in *Nature* 146:829, 1940; *Sci. J. Roy. Coll. Sci.*, Vol. 12, 1942 and *Endeavour* 2:69, 1943.

In 1857 the brothers T. and H. Smith of Edinburgh prepared an alkali-insoluble, high boiling portion from Cannabis resin that was not an alkaloid, but exhibited physiological activity. Many subsequent workers failed to realize that this was an exceedingly complex mixture.

In 1896 Wood, Spivey and Easterfield (Cambridge) obtained from the resin an active glassy product of boiling point 265°/20 mm which they named cannabinol. Dunstan and Henry in 1898 and the Cambridge chemists in 1899 realized that this was not a homogeneous product. They prepared from it a crystalline acetate that yielded on hydrolysis a resinous cryptophenol (C<sub>21</sub>H<sub>26</sub>O<sub>2</sub>) to which they transferred the name cannabinol, referring to the original product as "crude cannabinol". In the early 1930's Cahn took up the subject again and largely elucidated the structure of cannabinol, for which he suggested a dibenzopyran structure. The relative positions of the n-amyl and OH groups remained uncertain.



During the late 1930's and early 1940's the chemistry of Cannabis was advanced through the work of Todd et al. in Britain and of Adams et al. in the U. S. A. Progress was facilitated by the observation of Work, Bergel and Todd (1939) that cannabinol could be separated from the purified resin by distillation followed by p-nitrobenzoylation yielding a crystalline sparingly soluble p-nitrobenzoate. Cannabinol showed no activity in rabbits, the active material remaining in the non-crystalline portion of the esterified resin.

Evidence for the position of the OH and amyl groups in the cannabinol molecule was obtained by studying another constituent of Cannabis, i. e. cannabidiol ( $C_{21}H_{30}O_2$ ). It was isolated by Adams, Hunt and Clark (1940) and by Jacob and Todd (1940) and it was established that it was a cryptophenol with 2 OH groups and 2 double bonds. The positions of the two OH groups in cannabidiol and the simultaneous occurrence of cannabinol and cannabidiol in the plant suggested that the positions of the substituents were the same in both compounds. This was confirmed by synthesis (Adams, Baker and Wearn, 1940 and Todd and Wilkinson, 1940). Cannabidiol did not show any physiological activity but appeared to be responsible for the color reaction of Cannabis known as the Beam test, which is not given by the active principle of the drug.

One of the intermediaries in the synthesis of cannabinol by Todd and Wilkinson was a tetrahydrocannabinol. This compound exhibited "..... in high degree the characteristic effects of hashish in animals and man". Study of synthetic compounds of the type showed that if the side chain was varied, the activity increased to a maximum at n-hexyl and then fell off. Of the branched chain analogues only those where the branching occurred at the alpha-carbon showed marked activity, and one of them was about 16 times as active in the dog test as the synthetic THC and "..... is at least as active as the best material so far obtained from natural hemp resin". The levo-rotatory forms of these compounds have been shown to be much more active physiologically than the d-forms. Other optically and physiologically active THC's have been prepared by Adams et al. Despite claims by Haagen-Smit et al. (1940), Powell et al. (1941) and Wollner et al. (1942) to have isolated homogeneous tetrahydrocannabinols from the natural resin, Todd feels that complete proof of homogeneity is lacking, but that "..... it would appear to be established that the activity of hemp resin, in rabbits and dogs at least, is to be attributed in the main to tetrahydrocannabinols".

The rest of the paper discusses the hypothetical biosynthesis of these compounds in the Cannabis plant. This would involve at least three steps of which two - cannabidiol yielding an active THC by ring closure and the latter yielding inert cannabinol by dehydrogenation - have already been proven in the laboratory. The author notes: "This scheme, incidentally, offers a ready explanation of the variation in the composition of resin obtained from hemp grown under different climatic conditions". According to Todd (personal communication from G. T. Stockings) "..... hashish shows certain effects in man which are not produced by the synthetic materials examined". He adds: "This is perhaps not surprising when one remembers that the exact relationship between corneal areflexia in rabbits, ataxia in dogs and hashish activity in man has not been established (Loewe, 1945), and that the tetrahydrocannabinol fraction represents only a small proportion of the hemp resin".

Wolff, P. O. Marihuana in Latin America. The Threat it Constitutes. Washington D. C.:

Linacre Press 1949, 56 pp. [Trans. from Spanish Ed. B. Aires: El Ateneo 1948]

This small monograph, whose English translation was sponsored by the Washington Institute of Medicine, and whose foreword is by Harry J. Anslinger (U. S. Commissioner of Narcotics and U. S. Representative on the U. N. Commission on Narcotic Drugs), is primarily a diatribe against marihuana. Of the 18 chapters into which it is divided 7 are dedicated to the question of marihuana and crime, particularly in certain Latin American countries. The bibliography of 83 references (44 of which are from Latin American authors) is selective as to subject matter, point of view and country of origin. The contention of Anslinger in the foreword that Wolff "has been completely impartial, which is the basic requirement for all scientific investigation" is blatantly contradicted in the same foreword which ends: "Dr. Wolff makes a convincing case against marihuana". Perhaps the author's bias is best illustrated by his use of such epithets as: "vice" (p. 5), "evil" (p. 40), "shameful business" (p. 42), "scourge" (p. 42), "exterminating demon" (p. 45), "messenger of a false happiness" (p. 52), "panderer to a treacherous love" (p. 52), "weed of the brutal crime and of the burning hell" (p. 53), "diabolical resin" (p. 53).

It should be noted that this book appeared five years after the publication of the controversial Mayor's Report already reviewed in this Guide. Anslinger's statement that: "He [Wolff] convincingly refutes the attempts by the La Guardia Committee and others to minimize the deteriorating effects of marihuana" typifies the lack of detachment that prevailed in so much of the American literature on marihuana at the time. The book is practically devoid of hard data. The material presented consists mainly of conclusions and opinions of various authors, and of anecdotal examples of one sort or another. The content of each chapter is as follows:





Chapter 1 - The Marihuana Vice (pp. 1-3). Defines the term vice and applies it to the habit of using marihuana.

Chapter 2 - The Botanical Aspect (p. 3-4). Points out that Cannabis is one species with several varieties determined by soil and climatic conditions. Some of these varieties are primarily rich in fiber and others in the pharmacologically active resin.

Chapter 3 - The Denomination "Marihuana" (pp. 4-5). Calls attention to the great variety of names by which Cannabis is known throughout the world and notes that the etymology of the term "marihuana" is as yet an unsettled question.

Chapter 4 - The Use of Marihuana (pp. 5-10). Warns against the threat that marihuana constitutes in Latin America and describes its use in Brazil, Mexico and Cuba.

Chapter 5 - General Effects (pp. 10-14). Are well known and need no further description. Under the action of the drug the subconscious is freed from inhibitory influences and conscious control. This explains the varied individual reactions to the drug and constitutes its main danger since they cannot be foreseen. This also makes it difficult to systematize the symptomatology of the intoxication. Moreau de Tours' description still stands. Chronic and physical symptoms are described.

Chapter 6 - The Value of Experimental Observations with Marihuana (pp. 14-18). Discusses the problem of the evaluation of clinical and experimental observations on the effects of marihuana and notes the various factors that may influence the results such as: the personality of the user, the emotional and physical condition of the subject, the environmental circumstances, the dose and the cultural level of the individual. Since many reported experiences have not taken these factors into account they are of little value, but observations and auto-observations by physicians are of interest.

Chapter 7 - Psychopathic Manifestations (pp. 18-23). Considers that the conclusions of Allentuck and Bowman (Mayor's Report) minimized the seriousness of the psychiatric conditions resulting from marihuana use; many psychiatrists from India, Turkey, North Africa, South Africa and Egypt "attribute to marihuana an etiological responsibility for a considerable number of psychiatric cases or serious modifications in character". Dose and length of use are important factors and the problem deserves further study. Paranoid reactions may result in aggressive behavior having a bearing on crime.

Chapter 8 - Delinquency and Criminality (pp. 23-27). "All of the physicians who take an interest in these matters are in agreement in this particular, except for a few dissenters who are reluctant to recognize the ominous influence exercised by marihuana in the perpetration of crime". The major "dissenters" are the La Guardia Committee and Bromberg in the United States, and Segura Millán and Salazar Viniegra in Mexico. In contrast, most authors agree that marihuana is a cause of crime, such as Stringaris (Greece), Porot (Algeria), Uzman (Turkey), Perrusel (Tunisia), Castellanos (Cuba) and Oneto Barenque (Mexico).

Chapter 9 - The Situation in Mexico (pp. 28-33). Describes the illicit cultivation, trafficking, and use of marihuana and its effect on crime in recent years, by means of examples and anecdotes.

Chapter 10 - Marihuana as a Criminologic Agent (pp. 33-36). Expounds the view that marihuana not only exaggerates criminal tendencies already present in the individual but that "... it can also create criminal attitudes and acts". One of the two examples given as evidence is that of a boy who, under the influence of marihuana, dreamed that he had killed his step-father and surrendered to the police. That is to say, no crime was actually committed.

Chapter 11 - The Situation in Cuba (pp. 36-40). Describes the use of marihuana in Cuba and particularly its influence on criminal behavior which is as serious as that in Mexico and Brazil.

Chapter 12 - The Situation in Other Latin American Countries (pp. 40-42). Produces evidence to show that the use of marihuana is spreading to such areas as Colombia, Ecuador and Central America.

Chapter 13 - The Situation in the Argentine (pp. 42-45). Use of marihuana in Argentina is practically nil due to the strict vigilance and control by the authorities but "the threat unquestionably exists". The author considers it as a "disturbing symptom" that the public appears to be well-informed about marihuana and concludes: "In order to prevent the spread of the evil, there is no doubt whatever that it is better not to touch upon these subjects, not to popularize the matter, not to arouse curiosity".

Chapter 14 - Medicolegal Problems (pp. 45-46). The question of the legal responsibility of a delinquent who commits a crime while under the influence of marihuana is discussed. The author feels that a legal distinction should be made between the individual who commits a crime while suffering from a temporary delirium (who should be confined), and the one who knowingly and deliberately takes the drug to commit a pre-meditated crime, in which case marihuana "cannot constitute an extenuating circumstance".





Chapter 15 - The Habituation to Marihuana (pp. 46-48). The author feels that although everybody is agreed that marihuana does not produce physical dependence, psychic dependence is strong "so that there is an imperative anxiety to continue to smoke marihuana and the subject is prone to show almost irresistible desires to obtain the drug".

Chapter 16 - The International Aspect (pp. 48-51). International and national controls on the traffic in marihuana are described. Although the League of Nations sponsored many studies on marihuana much remains to be investigated, but "In spite of this, three facts can already be seen very clearly: that the resin is extensively consumed in various parts of the world, that it produces disastrous effects, and that it requires energetic international action".

Chapter 17 - The Threat it Constitutes (pp. 51-52). Proof that the author's views on "the threat that marihuana implies against us . . . . . " are not exaggerated is the spread in the use of the drug in the United States in the past 15 years and a similar phenomenon in Brazil in recent years.

Chapter 18 - Final Considerations (pp. 52-53). Are best left to the author himself; "It is this weed which sunders the bonds of inhibition that make it possible for men to live together in society; weed of the brutal crime and of the burning hell; this weed which splits the personality, which invades the prison and the asylum, the hovel and the palace, which subjugates the savage and the cultured; this weed which attempts to convert paupers into kings, weaklings into champions, minutes into years, and evil into good, this weed which brings dreams, which sets free the spiritual and the bestial, and, with the ease that Baudelaire and Gauthier pen famous pages, makes the rabble bespatter pages with blood. There you have the picture of this diabolical resin which approaches under the mask of pleasant friendship".

And finally: "While opium cures and punishes like a god, and while it can be a sublime gift bestowed upon mankind, but also an infernal scourge, marihuana, on the contrary, has no sublime characteristics, but only inflicts blows upon its addicts, renders them depraved, degrades them physically and morally".

Johnson, D. Mc. I. Indian Hemp. A Social Menace. London: Christopher Johnson 1952, 112 pp.

The avowed purpose of this book is to provide information for the British professional and lay public on the subject of Indian hemp. The first five chapters review certain aspects of the literature on Cannabis, while the last four are dedicated to the personal views of the author on such topics as: the similarity between Cannabis intoxication and mania, the possibilities of the use of Cannabis to incriminate people as insane, the likelihood that the purges of the 1930's in the Soviet Union were due to mass Cannabis poisoning, and the potential use of the drug in the Cold War as a psycho-pharmacological weapon.

Chapter 1 - Drugs and Dope (pp. 11-18). Deals with the general question of drugs of addiction which the author classifies into three groups: 1) "Morphine and its derivatives, heroin, opium and cocaine [Sic]". 2) Cannabis derivatives: marihuana and hashish. 3) "Sedatives such as veronal, phenobarbital, aspirin [Sic], etc.". .

Chapter 2 - Indian Hemp Through the Centuries (pp. 19-28). The historical literature on the use of hemp is covered from the earliest references to the European literature of the 19th century. The chapter seems to have been taken directly and without acknowledgment from Walton's Marihuana - America's New Drug Problem. For example, Johnson (p. 19): "A knowledge of the narcotic properties of hemp is shewn in the following quotation taken from the biography of the physician Hoa-tho, who lived about A.D. 220". Walton (p. 2): "A knowledge of the narcotic properties of hemp is indicated by the following quotation taken from the biography of the physician Hoa-tho who lived about 220 A.D." Johnson (p. 21): "In another passage Galen says that cannabis seed extinguishes flatus and that the juice is used for earache, etc.". Walton (p. 9): "In another passage Galen says that cannabis seed extinguishes flatus and that the juice is used for earache, etc.". .

Chapter 3 - Marihuana in the United States (pp. 29-40). Consists of excerpts from The Marihuana Problem in the City of New York (Mayor's Committee Report) with due acknowledgment of the source in this instance.

Chapter 4 - Indian Hemp in England (pp. 41-51). Attempts to show, mainly through extensive quotes from the popular press, that marihuana smoking in England has been steadily increasing since the end of World War II, but that the medical profession and literature have ignored the subject.

Chapter 5 - The Effects of Cannabis indica (pp. 52-65). Taken from the Mayor's Report and from Walton's book, both with appropriate acknowledgment.



Chapter 6 - The Social, and Other, Importance of Indian Hemp (pp. 66-75). Is mainly devoted to an attempt to demonstrate that there is a strong resemblance between Cannabis intoxication and mania: "Poisoning by hashish runs its own specific and distinctive course. All the same each stage of the episode is identical in its manifestations with a phase of mania, thus evidencing the fact that the mental changes are essentially the same as those of mania". (p. 70). The author acknowledges that this thesis was first propounded by Moreau de Tours in 1845.

Chapter 7 - A Hypothetical Case: The Perfect Crime (pp. 76-87). This is an involved story purporting to show how Cannabis could constitute a social menace if used to cause temporary insanity in someone. The victim would be certified as insane and nobody would know the difference "unless heed is taken of the information in this book".

Chapter 8 - Matters for Conjecture (pp. 88-104). The thesis is advanced that the peculiar behavior of the Soviet authorities and political prisoners during the purges of the 1930's were due to contamination of the bread with Cannabis growing wild in the fields. There is also an attempt to demonstrate that the epidemic of poisonings that occurred in Pont Saint Esprit (France) in 1951 (which included some fatalities and several cases of temporary insanity) was due to Indian hemp and not to ergot as claimed by the local authorities.

Chapter 9 - A Menace Within a Menace (pp. 105-110). The chapter begins: "My foregoing pages will have proved, if nothing else, that the hemp drug is one of unusual and sinister properties". The author expounds the view that these properties ought to be known by the public at large - through books such as his - lest a small group of unscrupulous people use the knowledge of the drug to corrupt and dominate the whole community. The book ends by explaining how easy it would be for the Soviet Union, for instance, to "condition the mentality of a whole population" (such as that of Britain) by adding Cannabis to the grain and flour exported to other countries: "There would be increased receptivity to suggestion - a welling up of the collective unconscious - a breach in the mental barriers of individuality with the increased facilities of telepathic communication and of hypnotism that such a state would bring. There would be established, in fact, all the pre-requisites for the success of suddenly applied totalitarian propaganda".

Murphy, H. B. M. The Cannabis Habit. A Review of Recent Psychiatric Literature. Bull. Narcot. 15:15-23, 1963.

This is a critical review of the literature on the psychiatric aspects of the use of Cannabis, and covers the preceding 25-year period. The main topics discussed are the short-term psychological effects, Cannabis psychosis, personality traits of Cannabis users, the question of the antibiotic and other therapeutic properties of the plant and the physical consequences of chronic use.

Murphy notes that there are conflicting observations and opinions with respect to the effects of Cannabis on the human mind probably due to the fact that the drug has a "..... highly complex influence, dependent on personality and culture as well as on the drug itself". The need for studies of the effects of Cannabis at different dose levels is stressed because some of the best surveys available (Chopra) appear to focus primarily on the heavy user.

A parallel is drawn between the use of Cannabis and the use of alcohol in the following respects: Neither drug appears to have deleterious effects on the moderate user; single doses given to inexperienced unstable individuals may produce acute confusion, while chronic use of heavy doses can "..... probably lead to partial dementia or to an organic type psychosis"; both drugs appear to involve dangers for the neurotic and the psychopathic personality; neither drug tends to produce significant physical dependence, withdrawal symptoms or tolerance; and the attitude of society towards the deteriorated chronic user in countries where use of one or both drugs is permitted, is tolerant. The differences between the two drugs are considered to be: In large doses Cannabis may be more poisonous, while in small doses the effect on the mind is more distorting; Cannabis is more likely to lead to asocial passivity than to aggressiveness and antisocial behavior; it has more medicinal actions, and as far as has been reported, fewer pathological sequelae than the use of alcohol.

Murphy concludes that the evidence available does not prove that free access to Cannabis would be more harmful than free access to alcohol, or that its use is more socially or personally disruptive. He suggests, therefore that the reasons why Cannabis is consistently banned in countries where alcohol is permitted may be: Caution, stemming from sensational and alarmist reports; confusion between the causes and effects of habituation to Cannabis; true abuse of the drug in certain areas of the world similar to the abuse of alcohol in 18th century Britain; and, finally, a moral attitude derived from the Protestant work ethic that implies fear and mistrust of anything that leads to inaction and passivity. He ends by suggesting that Cannabis is banned because its potential users have relatively little influence in societies that permit alcohol.





Downing, D. F. Psychotomimetic Compounds. V. Tetrahydrocannabinols. In: Psychopharmacological Agents. Vol. 1, ed. by Maxwell Gordon. N. Y.: Academic Press 1964, pp. 585-91.

This is an excellent review of the chemistry of Cannabis. The history of the attempts to isolate the active principle up to the work of the 1940's is dealt with briefly, but developments since then are described lucidly and in considerable detail. These include the investigations of Adams et al. in the U. S. A. and of Todd et al. in England that led to the final elucidation of the structure and synthesis of cannabinal, the identification of cannabidiol, the synthesis of the tetrahydrocannabinols and the demonstration that the latter possessed a high degree of physiological activity. Discussion of more recent work, dealing mainly with the isolation and identification of tetrahydrocannabinols in Cannabis extracts by means of modern techniques, completes the review. Some comments on the pharmacology of many of these compounds are also included.

Grlić, L. Recent Advances in the Chemical Research of Cannabis. Bull. Narcot. 16:29-38, 1964.

This is a comprehensive review of recent work on the chemistry of Cannabis. Of the 56 references listed, 42 belong to the period 1960-1964. The topics covered are: Structure and biogenesis of the cannabinoids, separation and isolation of Cannabis constituents by various methods, chemical and physical tests for the identification of Cannabis and cannabinoids, and antibacterial constituents. The most important section refers to the development of methods for the separation and isolation of the constituents of Cannabis (pp. 30-34). These are: counter-current distribution, and paper, thin layer and gas chromatography. The earlier literature on the subject is not reviewed.

McGlothlin, W. H. Hallucinogenic Drugs: A Perspective with Special Reference to Peyote and Cannabis. Santa Monica, Cal.: Rand Corporation 1964, 81 pp. [Mimeographed].

The current controversy over the merits and dangers of the non-medical use of LSD and other new hallucinogens led the author to an examination of the literature on peyote (mescaline) and Cannabis. The effects of both drugs, particularly those of peyote, resemble in important respects those of LSD. Furthermore, peyote and Cannabis have been used for a long time and their actions and consequences are well documented in the literature. For these reasons the author felt that a study of the literature on these drugs might throw some light on equivalent aspects of the use of the new hallucinogens, particularly with respect to: the proportion of the population that might be attracted to their use; its purpose; the frequency of use; and the possibilities of development of addiction or emotional dependence, of psychoses, of an interest in more addicting drugs, of personality changes and of economic, family and social effects.

Section II (pp. 5-8) discusses the current concepts of drug addiction and habituation. Section III (pp. 9-37) is a review of the literature on peyote. Section IV (pp. 38-60) deals with the literature on Cannabis, and Section V, entitled The LSD Controversy, discusses the topic in relation to the use of the older hallucinogens.

The review of the literature on Cannabis, based on a bibliography of 40 references, covers the following topics: history and description of the drug; Cannabis intoxication and its similarity to that of peyote and LSD; motivation for use; frequency of use and the question of addiction; physical and mental effects; long-lasting effects; Cannabis and crime, and a summary and appraisal.

The main conclusions are: "Cannabis is an hallucinogen whose effects are somewhat similar to, though much milder than, peyote and LSD". The confirmed user takes the drug mainly for its euphoriant effect which he achieves by carefully regulating the dose. Mild tolerance, physical dependence and various untoward physical effects may occur with excessive use, but are not observed in occasional or moderate users. The most serious danger is a toxic psychosis, particularly in mentally unstable individuals. Excessive use in some Eastern countries is considered to be directly or indirectly responsible for a significant number of admissions to mental hospitals. In the U. S. A. the drug generally is not used to excess, but "..... it does attract a disproportionate number of poorly adjusted and nonproductive young persons in the lower socio-economic strata". Current use in Eastern countries is also mainly confined to the lower classes. The claim that Cannabis is a cause of major crime is unfounded and "..... it probably has no more effect than alcohol in this respect". Those familiar with the use of Cannabis in the U. S. A. generally consider the legal restrictions too severe.



Section V - The LSD Controversy - does not really relate the information set forth in the previous sections to the question of LSD use. Rather, it raises a new and interesting, but relatively independent matter of the possible role of hallucinogens in contemporary Western society. The author concludes that LSD is probably a dangerous drug if used indiscriminately, but that it might prove to be of value in controlled psychotherapy. More important, in the author's opinion, is the question whether wide-spread use of these drugs would prove harmful to the pattern of Western society because of passivity and withdrawal, or beneficial by virtue of improved self-understanding among the mentally healthy. He suggests that the latter point could be investigated scientifically, although this is unlikely as long as prevalent social attitudes dictate what is permitted to be considered a valid scientific question.

Wolstenholme, G. E. W. & Knight, J. (Eds.). Hashish: Its Chemistry and Pharmacology.

Ciba Foundation Study Group No. 21. London: Churchill 1965, 96 pp.

Despite its title this volume is not a comprehensive review of the chemistry and pharmacology of Cannabis, but a collection of five papers. Of these, four report original experimental work and the fifth reviews the literature on the type of dependence produced by Cannabis. Each paper is followed by the comments of the participants in the symposium, and the volume ends with a general discussion of drug dependence, the treatment of depressions and tests for identifying hashish users. The main merit of the book lies in these discussions, since they give a clear picture of the state of knowledge in the field three years ago. This is particularly true of the exchange of ideas following the papers by Korte and Sieper on the chemistry of Cannabis, and of Miras on some aspects of its pharmacological action.

Joachimoglu, G. Natural and Smoked Hashish (pp. 2-11). The first part of this paper deals in a general way with such topics as the use of Cannabis in various parts of the world and its international control, its addictive liabilities, and its pharmacological effects in animals and man. In the second part the author describes the results of experiments in which the LD<sub>50</sub> and the minimum dose necessary to inhibit mobility in mice were determined after the intraperitoneal administration of oily solutions of a conventional Cannabis extract, and of the sublimate obtained from a mechanical cigarette smoker. Both the LD<sub>50</sub> and the minimum dose were lower in the case of the Cannabis extract than in the case of the sublimate, i. e. the former was more toxic than the latter.

The discussion centers around the chemical alterations that might occur in smoked Cannabis and the criminogenic action of the drug.

Korte, F. & Sieper, H. Recent Results of Hashish Analysis (pp. 15-30). By subjecting ligroin extracts of German Cannabis to adsorption chromatography and counter-current distribution the authors were able to obtain crystalline cannabidiol and a mixture of oily tetrahydrocannabinols (THC). Two crystalline isomers (melting points 146° C. and 128° C.) were obtained from the latter mixture. Evidence is presented that the most probable position of the double bond in the cyclohexene nucleus of cannabidiol is 3,2. Therefore the double bond in THC is likely in the same place. However, double bond migration may then permit other isomers of THC to be formed. Variation in the proportions of the different THC isomers present may explain variation in the pharmacological properties.

The THC isomers obtained from Cannabis and hashish extracts could not be satisfactorily separated by column chromatography or counter-current distribution. A better and very highly selective method proved to be partition chromatography on thin adsorption layers of silica gel, which yielded three separate isomers. When cannabidiol was subjected to various treatments such as temperatures of 200 and 300°, ultraviolet light and proton-catalyzed isomerization, the THC's obtained were not chromatographically identical to the natural compounds. But treatment of cannabidiol with heat, acid and oxygen yielded a mixture of THC's, cannabinol and other phenolic components that were chromatographically identical to the natural constituents of Cannabis. In view of these results the authors suggest that cannabinol, THC's and other phenolic compounds "..... are probably artefacts, formed from cannabidiol as a result of external influences".

Thin layer chromatography was adapted for the quantitative determination of cannabidiol, cannabinol and a mixture of the three THC's directly from the plant extract. After elution from the chromatograms the compounds are measured spectrophotometrically. Accuracy is 5 - 10%. The concentrations of these compounds in Cannabis from various countries is presented. The highest concentration of THC (0.38% of dry drug) was found in Cannabis from Cyprus, and the lowest (traces) in the Canadian drug.

The discussion clearly reveals two of the principal problems in the Cannabis field: 1) the question of the uneven chemical composition of extracts obtained from plants grown in different places, under different environmental conditions, and harvested by different methods; and 2) the related difficulty of establishing the active principle or principles since the composite action of the crude product may be due to more than one constituent. Sieper feels that not all THC's are equally active euphoriants.





Miras, C. J. Some Aspects of Cannabis Action (pp. 37-47). The distribution of radioactivity in various tissues of the rat was measured 1.5 hours after the intraperitoneal injection of  $C^{14}$  THC. Most tissues, including the brain, showed some radioactivity, the highest amount being found in the liver (4.85% of the injected dose), but the total recovery was very low. Intraperitoneal administration of Cannabis resin (250 mg/kg) 30 and 60 minutes before administration of iodine-131 to rats produced a significant inhibition of uptake by the thyroid gland. Administration of Cannabis resin to rats prolonged the sleeping time induced by barbiturates; this effect persisted for up to 30 days after the last dose of Cannabis. Intraperitoneal administration produced hypothermia lasting several hours. Chronic administration in the food produced depression and a diminution of the reproductive activity of rats. No effects were observed in the offspring.

The significance of the experiments with  $C^{14}$  THC is discussed, as well as the problems of solubility and mode of administration of Cannabis components, the behavioral effects and, more particularly, the vexing question of what chemical entities in Cannabis produce what pharmacological effects.

Watt, J. M. Drug Dependence of Hashish Type (pp. 54-66). The author examines the views of experts from many different countries with respect to the addictive liabilities of Cannabis. The consensus is that the drug by itself produces neither physical dependence nor addiction, but that many people use it habitually for the pleasurable effects that it produces. The author considers that availability of the drug, potency, dosage and modes of administration play a role, but are not primary factors in the development of the habit. On the other hand, personality defects and incipient psychotic disorders are seen as its primary cause. For these reasons habitual Cannabis users, as in the case of drug dependent persons, are considered unstable individuals who should be subject to rehabilitation. This should have two aims: separation of the individual from other Cannabis habitués, and treatment of his psychiatric disorder by psychotherapy and sociotherapy.

The discussion deals with the various subjective effects of drugs that might explain their liability to produce dependence. There is no consensus.

Garattini, S. Effects of a Cannabis Extract on Gross Behavior (pp. 70-78). Intraperitoneal administration of a Cannabis extract to mice and rats produced a reduction of spontaneous locomotor activity but no clear effects on curiosity, reactivity, irritability, response to pain, muscular tone, and corneal, pinna and righting reflexes. It did not influence the effects of amphetamine in grouped mice or of tryptamine in rats. Intraperitoneal administration to rats produced a moderate degree of hypothermia which was not proportional to the dose. This effect was more marked after intracerebral administration. Intraperitoneal or intracerebral administration to rats 30 minutes before pentobarbital significantly increased the sleeping time and the number of animals showing narcosis. Administration of the extract under various experimental conditions did not affect the levels of serotonin in the brain and intestine, or of noradrenaline in the brain and heart. The extract produced a transitory inhibition of learning ability in suckling rats and a clear inhibition of aggressive behavior induced in mice through isolation.

The author concludes that the Cannabis extract can be defined as a sedative drug because of its effects on locomotor activity, aggressivity and barbiturate sleeping time. However, it differs from other sedative drugs in that, unlike the phenothiazines, it does not affect the central stimulation induced by amphetamine and tryptamine and, unlike reserpine, it does not affect the level of tissue amines. The mechanism of action and the constituents in the extract responsible for these effects are not known.

The subsequent discussion by participants touches upon various problems of the pharmacology of Cannabis such as: the interaction with the barbiturate effect, species differences in response, the analgesic effect, content of THC in the extract, solubility and absorption problems, mode of action, etc.

General Discussion (pp. 83-94). This is in three parts. In the first, Collier suggests a theory of drug dependence to account for the phenomena of tolerance and of the withdrawal syndrome. Tolerance could arise in two ways: 1) By induction of silent storage receptors by a drug. This would mean that some of the drug would be taken up by the silent receptors without producing a response, leading to a need for higher doses. This would not necessarily be associated with dependence. 2) Tolerance, as well as dependence and abstinence symptoms, might arise if the drug cuts off the supply or blocks access to natural receptors of an endogenous normal metabolite. This would lead to the induction of more receptors for this substance, to a greater sensitivity to it, and therefore, to a reduced effect of the drug, i.e. tolerance. Removal of the drug would imply an excessive reaction to the endogenous substance because of the presence of a larger number of receptors, i.e. abstinence symptoms. An example would be the blocking of the 5-hydroxytryptamine receptors by morphine. Cannabis does not appear to fit this model. Arguments for and against the theory are discussed.

The second part of the general discussion concerns the treatment of depression. There have been contradictory claims with respect to the effectiveness of a synthetic THC derivative (Synhexyl) in psychotic depressions. The problems of clinical trials, such as experimental design, diagnosis and assessment of results, the effects of a pure synthetic derivative versus those of the whole natural drug, the possible administration of mixtures of drugs affecting various components of the psychiatric picture, etc., are discussed.





In the third part of the discussion the need for a test to identify Cannabis users is stressed. Sieper suggests a method based on thin-layer chromatography capable of detecting as little as  $10^{-2}$   $\mu$ g of cannabinol in the urine. Joachimoglu feels that complicated methods of analysis are useless for the control of narcotics, and suggests that measurement of the blood sugar level may be more practical. This suggestion is not pursued in the discussion, perhaps because it is so obviously impractical in view of the large number of physiological factors that may alter the blood sugar level or glucose tolerance.

Solomon, D. (Ed.). The Marihuana Papers. New York: Bobbs-Merrill 1966, 448 pp.

This thick volume is essentially an anthology of literary and scientific writings on Cannabis. The selection of items for inclusion was dictated by the editor's personal viewpoint on the topic of Cannabis use. With the exception of the foreword, introduction, and short notes written to introduce each selection, the book contains only three original articles. Timothy Leary and Allen Ginsberg expound their well-known views on the question of consciousness-expanding drugs in the papers The Politics, Ethics, and Meaning of Marijuana and First Manifesto to End the Bringdown. Half of the latter paper was written while the author was under the effects of Cannabis. William S. Burroughs contributes a piece entitled Points of Distinction Between Sedative and Consciousness Expanding Drugs. The rest of the volume consists of reprintings of works well-known to anyone familiar with the literature on Cannabis.

The material is organized into three main sections referred to as Books. The first deals with historical, sociological and cultural aspects of the topic and includes contributions by Lindesmith, Becker, Carstairs and Leary. The second book is a compilation of literary writings ranging from those of Rabelais to Allen Ginsberg's article. The last book, entitled Scientific Papers, devotes 133 pages to a reprinting of most but not all sections of the report of Mayor La Guardia's Committee. It includes, in addition, a paper by Tayleur Stockings on the use of Cannabis in the treatment of the depressions, quotations from Walton's monograph on the therapeutic uses of Cannabis, and McGlothlin's general review of the literature.

Of a total of 32 contributions 8 might be considered scientific in the conventional sense of the term. The rest are either literary pieces or ethical and philosophical positions held by various authors.

The purpose of the anthology is stated unequivocally in the foreword: "The editor of this book takes the point of view that the use of marihuana should be legalized. Science has demonstrated that the plant possesses a wide variety of therapeutic applications and investigation has proved that its popular use is harmless to the individual and to society" (p. XXI). And: "The Marihuana Papers, then have been compiled with the express purpose of supplying the accurate and authoritative information needed to perform the belated rites of the marihuana myths" (p. XXI).

The so-called scientific demonstration of the therapeutic usefulness of Cannabis is apparently based on the writings of Walton and Victor Robinson. Walton is quoted in such a manner as to leave the impression that he believed the claim to be justified by the facts. If Walton's chapter on Therapeutic Application is read in context it becomes evident that he was simply reviewing the pertinent literature and made little or no effort to assess the validity of the claims. It is interesting to note that of the 58 references cited by Walton, 41 were papers written in the 19th century when the scientific method was rarely applied to problems of this nature. The quote from Robinson, given as Ciba Symposia 1946, was published originally in 1912 and is an uncritical historical account of the medical use of Cannabis. The editor does not seem to have been able to distinguish between empirical use of a drug and scientific proof of its efficacy.

The statement that scientific research has proved that the popular use of marihuana is harmless, is based exclusively on the conclusions of the report of Mayor La Guardia's Committee on Marihuana. It is introduced thus: "Never before or since has so thorough and meticulous a scientific study been made on marihuana. Issued in 1944, the Mayor's Report still remains the most impressive collection of factual findings in the whole body of scientific literature on marihuana - a literature that goes back thousands of years" (p. 228). Valuable though this study undoubtedly was, it certainly did not provide sufficient evidence to warrant Solomon's generalization. Furthermore, he is careful to omit from his extensive quotations those items which failed to support his presupposition. Some examples of such omissions are shown in square brackets below:

Aggressiveness and belligerency are not commonly seen, [and those showing such traits are not allowed to remain in 'tea-pads'] (p. 214).

[In a limited number of the subjects there were alterations in behavior giving rise to antisocial expression] (p. 215).

[In addition to its effect on mental states, physical symptoms resulting from the administration of marihuana were recorded . . . . . These symptoms may be disturbing to the subject, and if marked enough, cause anxiety and interrupt the euphoric state] (p. 215-216).



[In the total group studied, what are known as psychotic episodes occurred in 9 of the subjects] (p. 216).

[It was found that marihuana in an effective dose impairs intellectual functioning in general] (p. 218).

It is therefore clear that Solomon has misrepresented the evidence on which he rests his case, since none of the authorities quoted made the specific claims that he makes on their behalf.

The editor's bias and faulty judgment can also be illustrated with two literary examples. The selections from Ludlow's book The Hasheesh Eater leave the impression that his experiences with the drug, although rather extraordinary, were essentially pleasurable. But Ludlow's complete writings show clearly that he became strongly dependent on the drug and had to struggle to give it up. The selection from Rabelais is even more baffling since the classic French author in the pages here reprinted refers mostly to the botanical characteristics of the plant and to its useful fiber. In fact his only apparent reference to the pharmacological action fails to support Solomon's case: "But in the human being, who eats much or often of this seed, it tends to exterminate the generative principle; and while the Greeks used to employ it in making certain kinds of fricassees, tarts and fritters, which they ate after supper, along with their wine, as a dessert, it is, nevertheless, difficult to digest, hard on the stomach, begets bad blood and, on account of its excessive heat, goes to the brain and fills the head with painful and annoying fumes".

In summary, this is an arbitrary and uncritical selection of writings on Cannabis that at best makes for some interesting reading and at worst could be highly misleading to the newcomer to the field. This should not be interpreted as a judgment of the individual papers in the anthology, but rather of the editorial intent of the volume as a whole.





SUBJECT INDEX

Adams, R.	----	11, 19, 25, 29
Africa	----	1, 2, 3, 6, 9, 10, 12, 26
Algeria	----	8, 26
Allentuck, S.	----	1, 9, 26
Andrews, G.	----	iii
Anslinger, H. J.	----	25
Arabia	----	9
Asia	----	3, 8, 9, 12
Baker, B. R.	----	25
Baudelaire, C.	----	4, 7, 8, 10
Bayer, von W.	----	10
Beam Test	----	11, 25
Becker, H. S.	----	32
Bergel, F.	----	25
Beringer, K.	----	10
Bhang	----	13
Binet-Sanglé, C.	----	7
Blatt, A. H.	----	11
Bowman, K. K.	----	19, 26
Boyce, S. S.	----	6
Brazil	----	2, 26
Bromberg, W.	----	10, 23, 26
Brotteaux, P.	----	8
Burroughs, W. S.	----	32
Cahn, R. S.	----	8, 11, 24
Canada	----	10, 30
Cannabis -		
Animal Experiments	----	7, 18, 23, 25, 30, 31
Botany	----	1, 6, 8, 10, 26
Chemistry	----	1, 3, 8, 11, 19, 23, 24, 25, 29, 30
Cultivation	----	6, 10, 13
Dependence	----	2, 10, 18, 20, 23, 24, 26, 28, 29, 31



Effects -

Acute-Mental	----	1, 2, 7, 8, 10, 12, 16, 17, 18, 19, 20, 21, 22, 28, 29
Acute-Physical	----	1, 7, 10, 12, 16, 18, 19, 20, 21, 26, 29
Chronic	----	2, 9, 10, 14, 15, 16, 17, 19, 23, 26, 28, 29
Socio-Economic	----	2, 11, 12
Fiber	----	1, 6, 10
History	----	1, 8, 9, 13, 27
Lethal Dose	----	18
Literature	----	3, 5, 32
Methods of Assay	----	9, 11, 23, 24, 30
Modes of Administration	----	10, 12, 13, 15, 24, 30, 31
Nomenclature	----	1, 11, 13, 26
Prevalence of Use	----	10, 12, 14, 19, 20, 25
Psychosis	----	4, 7, 8, 20, 26, 28, 29
Relation to Crime	----	10, 11, 12, 17, 20, 26, 29
Resin	----	6, 23, 24, 25
Therapeutic Uses	----	7, 9, 11, 15, 19, 23, 31, 32
Traffic	----	9, 13, 14, 19, 20, 27
Tolerance to	----	10, 23
Users	----	7, 13, 15, 19, 22, 29, 31, 32
Canamo	----	1
Carstairs, G. M	----	32
Casparis, P.	----	8
Castellanos, I.	----	26
Chanvre	----	1
Charas	----	13
Chile	----	1
China	----	14
Chopra, G. S.	----	13
Chopra, I. E.	----	13
Chopra, R. N.	----	13
Clark, J. H.	----	25
Collier, H. O. J.	----	31
Dagga	----	iii
Dardanne, A.	----	iii



De Quincey, T.	----	10
Dontas, S.	----	10
Downing, D. F.	----	29
Dumas, A.	----	10
Duquenois-		
Mustapha Test	----	11
Easterfield, T. H.	----	8, 11, 24
Eddy, N. B.	----	3
Egypt	----	8, 9, 12, 26
England	----	3, 10, 27
Fraenkel, F.	----	10
France	----	3, 6, 28
France, H.	----	10
Ganja	----	13
Gaoni, Y.	----	1
Garattini, S.	----	31
Gautier, T.	----	7, 8, 10
Ginsberg, A.	----	32
Gomila, F. R.	----	10
Gomila Lambou, M. C.	----	10
Greece	----	8, 10, 12, 26
Grlić, L.	----	29
Haagen-Smit, A. J.	----	25
Hashish	----	1
Hay, M.	----	7
Hemp	----	1, 6
Henry, T. A.	----	24
Herodotus	----	8
Homer	----	7
Hunt, M.	----	25





India	----	1, 2, 3, 6, 10, 12, 13, 14, 26
India- Hemp Drug Commission	----	iii, 13
Iraq	----	10
Ireland	----	6
Iwanow, A.	----	10
Jacob, A.	----	25
Joachimoglu, G.	----	30
Joel, E.	----	10
Johnson, D. Mc. I.	----	26
Kant, F.	----	10
Knight, J.	----	30
Korte, F.	----	30
Krapf, E.	----	10
Lange, N.	----	7
Latin America	----	3, 10, 25, 26
League of Nations	----	3, 9, 27
Leary, T.	----	32,
Lindesmith, A. R.	----	32
Liouville	----	7
Loewe, S.	----	19, 23
LSD	----	29
Ludlow, F. H.	----	iii, 6, 10, 33
Maconha	----	iii
Marco Polo	----	7
Marihuana	----	1, 25
Marshall, C. R.	----	8
Marx, H.	----	10
Mayor's Committee on Marihuana	----	19, 25, 26, 27, 32
McGlothlin, W. H.	----	29, 32
Mechoulam, R.	----	1



Meunier, R.	----	6
Mexico	----	6, 10, 12, 26
Miras, C. J.	----	31
Moreau de Tours, J. -J.	----	iii, 4, 7, 26, 28
Murphy, H. B. M.	----	28
North America	----	1, 2, 4, 6, 8, 9, 10
O'Shaughnessy, W. B.	----	3
Palestine	----	10
Perrusel, G.	----	26
Persia	----	10, 12
Peyote	----	29
Porot, A.	----	26
Powell, G.	----	25
Rabelais, F.	----	32, 33
Richet, C.	----	7
Robinson, V.	----	32
Roux, F.	----	7
Russia	----	10, 12, 28
Salazar Viniegra, L.	----	26
Schoenfeld, D. D.	----	19
Segura Millan, J.	----	26
Serviço Nacional de Educação Sanitaria	----	iii
Sieper, H.	----	30
Skliar, N.	----	10
Smith, H.	----	24
Smith, T.	----	24
Solomon, D.	----	32
Spivey, N. T. N.	----	8, 11, 24
Stockings, T.	----	32





Stringaris, M. G.	----	10, 12, 26
Syria	----	8, 12
Taylor, B.	----	6, 10
Tetrahydrocannabinols	----	3, 19, 23, 24, 25, 29, 30
Todd, A. R.	----	11, 24, 25, 29
Tunisia	----	8, 26
Turkey	----	8, 10, 12, 26
Union of South Africa	----	iii
U. N. Commission on Narcotic Drugs	----	3
United Nations	----	3, 13
Urquart, D.	----	10
Uzman, M. D.	----	26
Van Vechten, C.	----	10
Voisin, A.	----	7
Wallace, G. B.	----	24
Walton, R. P	----	4, 9, 27, 32
Watt, J. M.	----	31
Wearn, R. B	----	25
Wechsler, D.	----	19
Wilkinson, S.	----	25
Wolff, P. O.	----	25
Wollner, H. J.	----	25
Wolstenholme, G. E. W.	----	30
Woltmann, A. G.	----	22
Wood, T. B.	----	8, 11, 24
Zis, P.	----	10







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